

Fishery Data Series No. 10-53

Sonar Enumeration of Pacific Salmon Escapement into the Nushagak River, 2005

by

Chuck E. Brazil

and

Gregory B. Buck

August 2010

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mideye to fork	MEF
gram	g			mideye to tail fork	METF
hectare	ha			standard length	SL
kilogram	kg			total length	TL
kilometer	km				
liter	L				
meter	m				
milliliter	mL	at	@		
millimeter	mm	compass directions:			
		east	E		
		north	N		
		south	S		
		west	W		
		copyright	©		
		corporate suffixes:			
		Company	Co.	alternate hypothesis	H _A
		Corporation	Corp.	base of natural logarithm	e
		Incorporated	Inc.	catch per unit effort	CPUE
		Limited	Ltd.	coefficient of variation	CV
		District of Columbia	D.C.	common test statistics	(F, t, χ ² , etc.)
		et alii (and others)	et al.	confidence interval	CI
		et cetera (and so forth)	etc.	correlation coefficient (multiple)	R
		exempli gratia		correlation coefficient (simple)	r
		(for example)	e.g.	covariance	cov
	d	Federal Information Code	FIC	degree (angular)	°
day		id est (that is)	i.e.	degrees of freedom	df
degrees Celsius	°C	latitude or longitude	lat. or long.	expected value	E
degrees Fahrenheit	°F	monetary symbols		greater than	>
degrees kelvin	K	(U.S.)	\$, ¢	greater than or equal to	≥
hour	h	months (tables and figures): first three letters		harvest per unit effort	HPUE
minute	min	Jan,...,Dec		less than	<
second	s	®		less than or equal to	≤
		™		logarithm (natural)	ln
		United States		logarithm (base 10)	log
		(adjective)		logarithm (specify base)	log _b , etc.
		United States of America (noun)		minute (angular)	'
		U.S.C.		not significant	NS
		U.S. state		null hypothesis	H ₀
		use two-letter abbreviations (e.g., AK, WA)		percent	%
				probability	P
				probability of a type I error (rejection of the null hypothesis when true)	α
				probability of a type II error (acceptance of the null hypothesis when false)	β
all atomic symbols				second (angular)	"
alternating current	AC			standard deviation	SD
ampere	A			standard error	SE
calorie	cal			variance	
direct current	DC			population	Var
hertz	Hz			sample	var
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY DATA SERIES NO. 10-53

**SONAR ENUMERATION OF PACIFIC SALMON ESCAPEMENT INTO
THE NUSHAGAK RIVER, 2005**

by

Chuck E. Brazil and Gregory B. Buck

Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

August 2010

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*Chuck E. Brazil and Gregory B. Buck,
Alaska Department of Fish and Game, Division of Commercial Fish,
333 Raspberry Rd., Anchorage, Alaska 99518, USA*

This document should be cited as:

Brazil, C. E., and G. B. Buck. 2010. Sonar enumeration of Pacific salmon escapement into the Nushagak River, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 10-53, Anchorage.

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ABSTRACT

Hydroacoustic techniques were used to estimate escapement of Pacific salmon *Oncorhynchus* spp. into the Nushagak River in Bristol Bay, Alaska between 8 June and 17 July 2005. Species specific estimates of the relative contributions of sockeye *O. nerka*, Chinook *O. tshawytscha*, chum *O. keta*, coho *O. kisutch*, and pink *O. gorbuscha* salmon in the escapement as well as the size, age, and sex composition of those species specific components were derived from samples obtained with drift gillnets at the sonar site. Final escapement estimates through 17 July were 1,049,620 sockeye, 172,708 Chinook, and 456,024 chum salmon. The sockeye salmon mid-point of the run was 3 days earlier while the Chinook and chum salmon migrations were 6 days earlier than the 1990–2004 average. The major age classes estimated for sockeye salmon were age-1.3 (62.4%), age-1.2 (17.9%), and age-1.4 (11.6%). The major age classes estimated for Chinook salmon were age-1.3 (42.5%), age-1.4 (32.4%), and age-1.2 (24.2%). The standard range (SR) dual frequency identification sonar (DIDSON) replaced the Bendix systems for estimating salmon escapement on the left (south) bank of the Nushagak River in 2005. Comparative studies were conducted on the right (north) bank facing downriver in 2004 and 2005, to determine whether a long range (LR) DIDSON would be a viable replacement for the Bendix sonars currently in use.

Key words: Pacific salmon *Oncorhynchus* spp., sonar, Nushagak River, Bristol Bay, escapement, estimation, fisheries management

INTRODUCTION

The purpose of this project was to estimate the escapement of the following 3 species of Pacific salmon *Oncorhynchus* spp. for the Nushagak River in Bristol Bay, Alaska: sockeye (*O. nerka*), Chinook (*O. tshawytscha*), and chum (*O. keta*) salmon. Escapement estimates are used to assess daily run strength and provide escapement goal information that is critical to the management of commercial salmon fishing in the Nushagak District.

In 1979, the Alaska Department of Fish and Game (ADF&G) examined the feasibility of using hydroacoustic (sonar) equipment on the Nushagak River and began developing these techniques to estimate adult salmon abundance (McBride 1981). Over subsequent years, the Nushagak River sonar project has evolved to the point that it provides reliable daily escapement information.

Estimating the numbers of salmon migrating into Nushagak River involves (1) estimating the number of hydroacoustic targets passing through the sonar beams, (2) estimating the species composition of those targets, and (3) combining estimates of hydroacoustic targets and species composition to estimate numbers of passing salmon by species (Miller et al. 1994a).

This project is currently in a state of transition. The Bendix sonar equipment, which has been in use for many years, has been difficult to maintain and keep operational. In addition, Bendix sonar equipment has a limited range and an inability to determine a fish's direction of travel (upstream or downstream). Furthermore, signal processing occurs in the system's short term memory with no capability to store the raw signal. The system was designed to produce only a final count. Therefore, counts could not be reviewed or reproduced later. These shortcomings have led ADF&G to conduct comparative studies with other hydroacoustic systems that would replace the Bendix sonar system on the Nushagak River.

In 2002, ADF&G began testing the feasibility of the standard range (SR) dual frequency identification sonar (DIDSON¹) to evaluate its capacity as a viable replacement for the existing Bendix counters (Maxwell and Gove 2002). Originally developed by the University of Washington, Applied Physics Laboratory to allow divers to visually identify mines in turbid waters, the DIDSON creates video-like images (Belcher et al. 2001; Belcher et al. 2002).

¹ Product names used in this report are included for scientific completeness, but do not constitute a product endorsement.

The DIDSON's small pulse widths, high frequency, and small multiple beams create identifiable fish targets even when more than one fish is in the beam. The higher than standard frequency waves reflect off the entire surface of the fish as opposed to only the acoustically 'hard' swim bladder. This creates an actual image of the fish that can be directly counted on a video feed whereas the Bendix sonar simply uses the echo return strength to estimate how many fish are in the beam.

During the 2003 and 2004 field seasons, the SR DIDSON was deployed on the left (south) bank (facing downriver) of the Nushagak River alongside the traditional Bendix system (Maxwell et al. *In prep*). In addition to its ability to produce high resolution images, the DIDSON has a unique acoustic lens system which allows the beam to be focused at different ranges by altering the frequency. The SR DIDSON was operated at 2 frequencies, 1.80 MHz which allows identification of targets out to 10 m and 1.10 MHz which allows identification of targets out to 36 m. This provided approximately the same coverage as the Bendix sonar counter.

In 2004 and 2005, a newly developed long range (LR) DIDSON was operated upstream of the Bendix counter on the right (north) bank (facing downriver) alongside the Bendix (Maxwell et al. *In prep*). The LR DIDSON operates at 2 frequencies, 1.20 MHz which allows identification of targets out to 20 m and 0.70 MHz which allows identification of targets out to 60 m. This provided greater river coverage than the Bendix. Additional comparisons of hydroacoustic estimates between the Bendix and DIDSON sonar systems will be made in future years. The escapement estimates used for management in 2005 were derived from the SR DIDSON on the left bank and the Bendix sonar equipment on the right bank.

In addition to estimating the total number of salmon migrating upstream, an accurate estimate of the species composition is needed as management goals differ by species. The species apportionment is made by drifting a suite of various sized gillnets in the ensonified area of the river and estimating catch-per-unit-effort for each species. This basic direct sampling approach has been modified numerous times over the years. Brannian et al. (1995) evaluated escapement sampling and the associated species apportionment methods used on Nushagak River during 1991 and compared them with methods used on the Lower Yukon River. Based on their review, new methods of estimating Nushagak River salmon passage by species were incorporated in 1992 (Miller et al. 1994a). The method used from 1992 through 2001 created a situation where preliminary species composition estimates were only made after 100 salmon were caught. After 100 salmon were caught, the preliminary species composition estimates were retroactively applied to the escapement count during the season. This created a situation where numerous inseason changes had to be made to the escapement estimate. This delay caused management concern about the ability to detect rapid shifts in species composition in a manner timely enough to allow management to react. An internal simulation analysis determined in 2002 that using a sample size of 5 fish to estimate species composition during a report period had minimal effects on the daily estimates and was less biased and more accurate (McKinley 2003). This method has the advantage of providing almost daily estimates of escapement without retroactive changes. The one downside to the reduction in sample size from 100 fish to 5 fish having to be caught during a report period was the increase in variance estimates for the species composition estimates.

OBJECTIVES

The project objectives in 2005 were to:

- 1) Estimate the number of adult sockeye, Chinook, and chum salmon in the Nushagak River from early June through late July such that the escapement estimates were within +/-10% of the true value 90% of the time. This was accomplished by combining the estimate of the number of salmon-sized hydroacoustic targets passing through the sonar beam(s) with the species composition estimate derived from test-fishing with drift gillnets.
- 2) Estimate the proportion of each of the major sockeye salmon age classes (1.2, 2.2, 1.3, 2.3, 1.4) in the Nushagak River to within 5% of the true proportion 90% of the time;
- 3) Estimate the sex composition of the sockeye, Chinook, and chum salmon escapement into the Nushagak River; and
- 4) Estimate the mean length by age of sockeye, Chinook, and chum salmon in the Nushagak River escapement.

In addition to these objectives, there were several tasks undertaken in 2005. These included:

- a) Collect environmental observations (temperature, precipitation, water clarity, etc) on a daily basis at the sonar site; and
- b) Collect DNA tissue samples from sockeye salmon that can be used to estimate the escapement composition.

METHODS

STUDY SITE

The Nushagak River is located in Southwestern Alaska and flows approximately 390 km from its headwaters to Bristol Bay (Figure 1). The Nushagak drainage has 2 main tributaries: the Nuyakuk River which drains the Tikchik Lakes from the west, and the Mulchatna River flowing in from the east. These rivers support large runs of 5 species of Pacific salmon (Table 1) as well as several resident species that are harvested in commercial, sport and subsistence fisheries.

This project was located on the lower Nushagak River, approximately 40 km upstream from the terminus of the Nushagak commercial fishing district and 4 km downstream from the village of Portage Creek (Figure 1). At the project site, the Nushagak River is contained in one 300 m wide channel, with the exception of one very small slough behind the camp. The site is within the range of tidal influence. While high tide causes a reduction of current there is rarely a reversal of flow, and it appears that fish are actively migrating past the project site as few fish are observed milling in the area. Robertson (1984) used scale pattern analysis to determine that the majority (93%) of sockeye salmon that migrated past Portage Creek were native to the watershed while Daigneault et al. (2007) identified the Nuyakuk, King Salmon and Koktuli Rivers as major spawning destinations of sockeye in this watershed. It appears therefore, that very few fish encountered at the project site are strays from other rivers that might back out of the river or migrate back downstream at a later date.

PROJECT DATE

Operation dates have varied over the years. In 2005 with declining budgets the project was terminated on 17 July. Historically, by this date about 95% of the cumulative sockeye salmon passage has occurred. From 1982 to 2004, with the exception of 1992 and 2003, operation dates extended from early June to at least 16 August each season to include the majority of the run for all salmon species. In 1992, the project terminated on 22 July due to budget shortfalls. Similarly, in 2003 with declining budgets the project terminated on 20 July, a date that historically has seen about 96% of the cumulative sockeye salmon passage. In 2004, the Bristol Bay Science and Research Institute (BBSRI) provided funds allowing the project to run through 18 August which allowed a more accurate estimate of the later-running coho salmon. With continuing budget constraints, it is not anticipated that project operation dates will extend past 20 July in future years.

HYDROACOUSTIC ESTIMATES

Bendix: Right Bank

The sonar equipment used for the estimation of the Nushagak salmon run between 1979 and 2004 (Gaudet 1990) consisted of an echo counter and 4 transducers manufactured by Bendix Corporation, an oscilloscope, and a power supply (12 volt battery with solar panel). Both inshore and offshore transducers were deployed alongside DIDSON equipment on both banks. While the Bendix equipment was used to generate escapement estimates in the traditional manner on both banks in 2005, only estimates generated on the right bank were used for escapement enumeration while left bank estimates were used only for comparison purposes with DIDSON estimates (Maxwell et al. *In prep*).

Inshore transducer counts were segmented into 12 range sectors. Offshore transducer counts were segmented into 16 range sectors. All transducers were operated at 515 kHz with a narrow pulse width of 100 μ s and a beam size of 2° offshore and 4° inshore. Pulse repetition rate, counting range, and sensitivity were adjustable.

Placement of the transducers and counting ranges was determined by a river bottom contour that includes a distinct break between a shallow slope near shore and a more pronounced offshore slope. This bottom topography dictated the deployment of 2 transducers (inshore and offshore) on each riverbank to achieve unbroken coverage. Offshore transducers, located where the slope of the river bottom changed, were aimed perpendicular to the water flow and towards the middle of the river. Inshore transducers were deployed within 10 m of shore in water of sufficient depth for fish passage, oriented perpendicular to the current and used to count out to the offshore transducer.

Transducers were mounted on metal tripods and aimed, with the aid of an oscilloscope, at the lower portion of the water column as the majority of the upstream migrating salmon are assumed to travel close to the river bottom due to reduction of water resistance. Minard (1985) found that over 88% of the fish occupied the lower two-fifths of the water column at the Nushagak River sonar site. The offshore transducers were aimed using remote-controlled pan and tilt rotators, while the shallower inshore transducers were aimed by manually adjusting the angle of the transducer mounts on the tripods. Once the transducers were properly emplaced, a picket weir was constructed from the shore to just beyond the inshore transducer on both riverbanks using pipe, aluminum angle, and plastic fencing. This was done to prevent fish from passing behind the

transducers or within approximately 1 m of the transducer face, a distance at which the system may not detect fish.

Each transducer was calibrated by comparing the output counts generated by the Bendix unit and counts made by a trained technician observing the transducer signal directly using an oscilloscope. Pulse rates were adjusted on each counter to maintain counting precision at $\pm 90\%$, using procedures described by Minard and Frederickson (1983). Counts from the oscilloscope were hand tallied for either a 10-minute period or 100 counts, whichever came first. At the end of the counting interval, the oscilloscope count was divided by the Bendix count to yield a percent agreement between the two. If the percent agreement was less than 90% or greater than 110%, the pulse repetition rate was adjusted until an acceptable percent agreement was achieved. Counters were calibrated throughout the day between 0600 and 2400 hours. The frequency of calibrations was somewhat dependent upon fish passage rates and the variability of fish swimming speeds; at least one calibration per hour was conducted during periods of peak fish passage. Sonar count data were summarized by sector, counter location (inshore, offshore, left or right bank), hour, and day to evaluate spatial and temporal distributions of sonar counts.

DIDSON: Left Bank

Escapement estimates used in 2005 were generated using a SR DIDSON on the left bank and a LR DIDSON on the right bank. Counts generated on the left bank were used for escapement estimates while counts generated on the right bank were only used for comparison purposes. These systems were deployed with a Hydroacoustics Technology Inc. automated, single-axis rotator, and a BioSonics attitude sensor (SR unit only) that provides heading, pitch, and roll data in 1s intervals. DIDSONs were affixed to the rotators and mounted on aluminum brackets. A laptop computer was used to control each DIDSON from a central location on the right bank. The right bank DIDSON was controlled through a direct connection and the left bank via a wireless connection. DIDSON counts were conducted in two 10-minute hourly counts on each bank in 2 strata: (1) inshore, 1–10 m, and (2) offshore. The inshore strata on both banks were 1 to 10 m and the offshore strata for the SR DIDSON were 10 to 30 m and 10 to 50 m for the LR DIDSON. These ranges were chosen as they are similar to the traditional Bendix counting ranges.

Attitude sensors and or bubble levels were used to emplace DIDSON units. Proper orientation for the best image was obtained by adjusting the heading, pitch and roll sensors. DIDSON units were deployed just upstream of Bendix units in water deep enough to cover the entire DIDSON at low water, approximately 0.19 m (7.5 inches) from the river bottom. Target testing was conducted with a tungsten steel ball passed through the sonar beam vertically and horizontally. Data was streamed to the sonar operations center on the right bank where it was handled on a dedicated laptop. Sonar files were recorded to an external hard drive on a schedule programmed into the DIDSON software.

DIDSON: Counting Fish on DIDSON (Playback of files)

The DIDSON software program was used to programmatically capture one 10 minute file using nearshore and offshore settings on each bank each hour. Equipment settings and timing of file record events was controlled using the DIDSON software. Frame rates were set as high as possible consistent with the desire to not drop a significant amount of frames during recording sessions (generally between 3 and 8 frames per second). Recordings were made using an

intensity setting of 90 and threshold of 10 using auto-frequency smoothing and default focus settings.

Playback of the hourly 10-minute files for near-shore and offshore strata was completed soon after they were recorded throughout the day, or early in the AM for overnight files. Missing 10-minute DIDSON counts on the SR DIDSON (left bank) were interpolated by averaging the counts from 2 hours before to 2 hours later. Missing counts on the LR DIDSON (right bank) were not interpolated as these counts were only used to compare with Bendix counts. Entering the 10-minute counts provided an accurate cross check of each day's hourly counts by stratum. Backup files were maintained on CD-ROMs.

SPECIES COMPOSITION SAMPLING

Daily sonar counts were apportioned among salmon species based on test-fishing catches collected with 18.3 m (10 fathom) drift gillnets with mesh sizes of 20.6 cm (8.125 in), 15.2 cm (6.0 in), and 13.0 cm (5.125 in). All gillnets were composed of mono twist filament webbing dyed Tairyo shade #T-14 a translucent light green. Twine size was dependent upon mesh size with 13.0 cm and 15.2 cm mesh gillnets constructed from #12 Tairyo #12 twine, and the 20.6 cm mesh gillnets constructed from #18 Tairyo #18 twine. Nets were 45 mesh (approximately 4–5 m) deep for the 13.0 cm mesh gillnets, 45 cm mesh for the 15.2 cm mesh gillnets, and 29 mesh (approximately 5–6 m deep) for the 20.6 cm mesh gillnets. These depths were selected to sample the entire water column.

Test fishing occurred just downstream of the transducers so that catches would be as representative as possible of the migrating stream of fish passing through the ensonified zone. Because of the possibility that species composition may differ with respect to distance from shore as well as between river banks, the river was divided into 4 separate strata (Left Inshore, Left Offshore, Right Inshore, Right Offshore). Inshore drifts started with one end on the bank, while offshore drifts started with the inshore end of the net deployed 10 m from shore.

The 13.0 cm, 15.2 cm and 20.6 cm mesh gillnets were fished for the entire season (8 June–16 July). During the period of peak sockeye salmon passage (17 June–15 July), drift sessions were conducted 3 times daily: morning (0800–1100 hours), mid-day (1300–1600 hours), and evening (1800–2100 hours). Prior to 17 June and after 15 July, drift sessions were conducted twice daily: mid-morning (0800–1100 hours) and early evening (1600–1900 hours). During each drift session, each mesh-size was fished for a targeted time of two 2-minutes per drift. During periods of high catches, drift times were shortened. Drifts were not conducted at night for safety reasons. The number of drifts conducted for each mesh size along each bank's inshore and offshore strata was 6 per day during the peak periods and 4 per strata during off-peak.

SPECIES COMPOSITION ESTIMATES

The daily escapement estimate by species was calculated by applying the catch per unit effort (CPUE) generated through test-fishing to the sonar counts for each stratum. The test-fishing unit of effort used was catch per fathom-hour.

While gillnets are very size selective, Miller et al. (1994b) and Miller (1995) found no discernable size selectivity for sockeye, Chinook, or chum salmon with 13.0 and 15.2 cm mesh gillnets. The 20.6 cm mesh gillnet, however, tended to select for large sockeye and chum salmon. Therefore, only 13.0 and 15.2 cm mesh data were used to apportion sockeye and chum salmon,

and catches from all 3 mesh sizes (13.0, 15.2, and 20.6 cm) were used to estimate the Chinook salmon apportionment (Brannian et al. 1995).

Fishing time (FT) was measured to the nearest second and recorded in decimal minutes and calculated for each drift by,

$$FT = RI - FD , \quad (1)$$

Where: FD was the point in time when the net was fully deployed and RI was the point in time when net retrieval was initiated.

The number of fathom-hours (FH) was calculated as,

$$FH = \frac{fFT}{60} , \quad (2)$$

Where: f was net length in fathoms (generally 10).

The CPUE for each salmon species (group) was based on a specific subset of gillnet mesh sizes, specified later in this report. The CPUE for each species (i) during session j in stratum k was calculated by summing the number caught (C_{ijkmn}) across mesh size (m) and drift (n):

$$CPUE_{ijk} = \frac{\sum_{m=1}^3 \sum_{n=1}^6 u_{im} C_{ijkmn}}{\sum_{m=1}^3 \sum_{n=1}^6 u_{im} FH_{jkmn}} , \quad (3)$$

Where: u_{im} equals 1 if species i from mesh m is used to estimate species composition, and u_{im} equals 0 otherwise.

The CPUE was summed across drift sessions to create a time and area stratified estimate of species composition. The minimum time period was 1 day. The minimum sample size for each time-area was 5 salmon (Appendix D1). If less than 5 salmon are captured during a time period in an area stratum (all mesh sizes); previous time periods were added until the minimum sample size was met. There were j^k sessions in period t and stratum k . The CPUE was used to estimate the proportion of species i in report period t and area stratum k :

$$CPUE_{itk} = \sum_{j=1}^{j^k} CPUE_{ijk} \quad (4)$$

The proportion (S_{itk}) of species i for time period t and area stratum k was estimated by:

$$\hat{S}_{itk} = \frac{CPUE_{itk}}{\sum_{i=1}^5 CPUE_{itk}} \quad (5)$$

To estimate the variance, the number of each species caught was assumed to have a multinomial distribution. We determined that sampling effort was fairly constant for all drifts within each time period and area stratum. Therefore, sample size would be equal to the total number of fish caught during a time period within an area stratum. Variance of \hat{S}_{itk} was estimated as:

$$Var(\hat{S}_{itk}) = \frac{\hat{S}_{itk}(1 - \hat{S}_{itk})}{C_{tk} - 1} \quad (6)$$

Ideally, we would have stratified the estimates of species proportion by drift session (2 or 3 drift session per time period). Unfortunately, sample sizes were often too small (<5 fish total) to estimate species proportion during each drift session. Therefore, the variance estimate for each time t and area stratum k was probably underestimated because the variance among drift sessions was not included.

BENDIX ESCAPEMENT ESTIMATES

Sonar counts for each area stratum (right and left bank, inshore and offshore) were apportioned by species i for period t on a daily basis. Time period escapement estimates for each salmon species area stratum (\hat{N}_{itk}) were based on estimates of species proportions (\hat{S}_{itk}) from escapement sampling and period sonar counts (\hat{n}_{tk}):

$$\hat{N}_{itk} = \hat{S}_{itk} \hat{n}_{tk} \quad (7)$$

Escapement (\hat{N}_i) by species i and time period t was estimated by summing strata estimates:

$$\hat{N}_i = \sum_{k=1}^4 \hat{N}_{itk} \quad (8)$$

As the Bendix performs continuous counts, there was no variance in the summed hourly counts (n_{tk}) due to sub-sampling. Thus n_{tk} was the sum of hourly counts during period t^k and which was known without variance whereas the variance of \hat{N}_{ijk} was estimated as:

$$Var(\hat{N}_{itk}) = \hat{n}_{tk}^2 Var(\hat{S}_{itk}) \quad (9)$$

The total variance $V(\hat{N}_i)$, was estimated as:

$$V(\hat{N}_i) = \sum_{k=1}^4 Var(\hat{N}_{itk}) \quad (10)$$

Cumulative escapement was calculated by summing daily estimates, with the total variance equal to the sum of the daily variances.

DIDSON ESCAPEMENT ESTIMATES

Estimates of species escapements and associated variances were derived from the DIDSON sonar system for comparative purposes. One 10-minute count was completed per hour per stratum (left bank inshore, left bank offshore, right bank inshore, right bank offshore). The total count (\hat{n}_{tk}) for time period t and stratum k was:

$$\hat{n}_{tk} = \sum_{h=1}^{h^t} 6\hat{n}_{ikh} \quad (11)$$

Where: \hat{n}_{ikh} is a 10-minute count conducted during hour h within period t^k and stratum k . Note that there are h^t hours in period t^k .

When the 10-minute count was expanded into hourly estimates, the variance was estimated using Wolter's (1984, 1985) V5 estimator for systematic sampling schemes. This has been found to be the least biased and most efficient estimator of variance when measuring salmon escapements through tower counting (Reynolds et al. 2007). It is not possible to develop unbiased estimates of variance with a systematic sampling scheme (Cochran 1977; Wolter 1984, 1985). It was not feasible to implement stratified random sampling for the Nushagak because of the limited crew size. Approximate variance estimators for systematic sampling are usually biased high (i.e., overestimate the precision of the escapement estimates); however, the bias was much less with the higher order V2, V3 and V4 estimators proposed by Wolter (1984, 1985) (Skalski et al. 1993). The variance was estimated as:

$$Var(\hat{n}_{tk}) = \frac{(1-f)}{h^t (3.5(h^t - 4))} \sum_{h=1}^{h^t} \left(\frac{n_{kh}}{2} - n_{kh-1} + n_{kh-2} - n_{kh-3} + \frac{n_{kh-4}}{2} \right)^2 \quad (12)$$

Where: f = sampling rate and then

$$Var(\hat{n}_{tk}) = (6h^t)^2 Var(\hat{n}_{ikh}) \quad (13)$$

Sonar counts for each area stratum (left and right bank, inshore and offshore) were apportioned by species i and time period t . These escapement estimates for each salmon species and area stratum (\hat{N}_{itk}) were based on estimates of species proportions (\hat{S}_{itk}) from escapement sampling and period sonar counts (\hat{n}_{tk}) where:

$$\hat{N}_{itk} = \hat{S}_{itk} \hat{n}_{tk} \quad (14)$$

Time period escapement (\hat{N}_{it}) estimates by species were estimated by summing area strata estimates:

$$\hat{N}_{it} = \sum_{k=1}^4 \hat{N}_{itk} \quad (15)$$

Goodman (1960) was followed to calculate the variance of \hat{N}_{itk} :

$$Var(\hat{N}_{itk}) = \hat{n}_{itk}^2 Var(\hat{S}_{itk}) + \hat{S}_{itk}^2 Var(\hat{n}_{itk}) - Var(\hat{n}_{itk})Var(\hat{S}_{itk}) \quad (16)$$

The total variance across all strata $V(\hat{N}_{it})$ was estimated as:

$$V(\hat{N}_{it}) = \sum_{k=1}^4 Var(\hat{N}_{itk}) \quad (17)$$

Cumulative escapement estimates were derived by summing daily estimates, with the total variance equal to the sum of the daily variances.

AGE, SEX, SIZE, AND GENETIC SAMPLING

Age, sex, and length (ASL) data were collected from sockeye, Chinook, and chum salmon migrating past the sonar site. Prior to 1995, only sockeye and chum salmon captured with beach seines were sampled for ASL data. This was an attempt to avoid size selectivity issues associated with gillnets (Miller et al. 1994a, 1994b; Miller 1995). However, in 1992, Miller (1994a) found that the 13.0 and 15.2 cm mesh gillnets both had length frequency distributions similar to those found in beach seine catches, with the 13.0 cm mesh gillnet sockeye salmon length frequency distribution most closely resembling that of a beach seine. Based on this information, sockeye salmon ASL data were collected from 13.0 and 15.2 cm mesh gillnets in addition to beach seines beginning in 1995 (Miller 1996). Between 1996 and 2003, sockeye salmon ASL information was collected only from 13.0 cm mesh gillnets and beach seines. Beginning in 2004 sockeye and chum salmon ASL information was collected from 13.0 and 15.2 cm mesh gillnets and beach seines. All Chinook salmon captured were sampled regardless of gear type, gillnet mesh size, or catch location in an effort to increase sample sizes for this species.

Age was estimated through the examination of scales (Mosher 1968). Scales were collected from the left side of the fish approximately 2 rows above the lateral line in an area crossed by a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). Because of the high rate of scale loss and regeneration among Chinook salmon, 3 scales were collected from each fish. A single scale per sockeye and chum was collected. Scales were mounted on gummed cards and impressions were made in cellulose acetate using a heated press (Clutter and Whitesel 1956). European notation, where numerals preceding the decimal refer to the number of freshwater annuli and numerals following the decimal refer to the number of marine annuli was used to record ages (Koo 1962). The total age of a fish, from the time of egg deposition (brood year) is the sum of these 2 numbers plus one to account for incubation time.

Seasonal sampling goals of 1,200 sockeye, 500 Chinook, and 500 chum salmon allow for the calculation of age composition estimates for three time strata (early, middle and late) in the case of sockeye and one time strata for Chinook and chum for all major age classes within 5% of the true percentage 90% of the time (Thompson 1987).

Age and sex composition was estimated as a series of proportions (p_{ias}) of a multinomial distribution of age (a), sex (s), and species (i):

$$\hat{p}_{ias} = n_{ias} / n_{it} \quad (18)$$

Where: n_{it} is the sample counted in period t and species i and n_{ias} is the number of age a and sex s counted in period t and species i . The marginal proportion was estimated for each combination of age and sex along with estimates of the proportions' variance (Cochran 1977) was estimated as:

$$Var(\hat{p}_{ias}) = \frac{\hat{p}_{ias}(1 - \hat{p}_{ias})}{n_{it} - 1} \quad (19)$$

The standard error of length (ℓ) by species, age, sex, and period of fish sampled in the escapement were calculated as:

$$se(\bar{\ell}_{iast}) = \frac{1}{n_{iast}} \sqrt{\frac{\sum_{k=1}^{n_{iast}} (\ell_{iastk} - \bar{\ell}_{iast})^2}{n_{iast} - 1}} \quad (20)$$

where, $\bar{\ell}_{iast}$ was the mean length of species i , age a , sex s , during period t and ℓ_{iastk} represents the length of fish k of species i , age a , sex s , and period t and n_{iast} was the number of fish of species i , age a , sex s , during period t .

Salmon were measured from the middle-of-the-eye to the fork-of-the-tail and lengths were recorded to the nearest 5 mm. In all species, sex was determined from external morphological characteristics. When genetic samples were desired, the axillary process near the pelvic fin was collected.

MIGRATORY TIMING

The average daily passage for sockeye, Chinook, and chum salmon was calculated using all years in which sonar data was available. Average daily proportions (\bar{p}_j) were derived by summing the daily proportions (p_{ji}) for all years used and dividing by total number of years used (Y):

$$\bar{p}_j = \frac{\sum_{i=1}^Y p_{ji}}{Y} \quad (21)$$

Average cumulative proportions by day were calculated by summing the average daily proportions through time.

The 2005 run was compared to the desired species goals. The average daily cumulative proportions for each species were multiplied by their respective escapement or inriver goals (550,000 for sockeye salmon and 75,000 for Chinook salmon). Currently there is no escapement goal for chum salmon; however, the management escapement objective is 190,000.

ENVIRONMENTAL DATA

Weather data was collected at approximately 0800 and 2000 hours each day. Precipitation was measured to the nearest mm using a Taylor Clear View rain gauge while air temperatures was

measured to the nearest 0.1 C using an Oregon Scientific digital thermometer, and wind direction and velocity (km/h) was measured using a Weathertronics anemometer.

RESULTS

HYDROACOUSTIC COUNTING

Hydroacoustic counting began in all strata on 8 June and ended 17 July. There were a total of 1,678,352 fish targets in 2005 (Table 1). The fish distribution varied by bank throughout the season with counts at the end of the season totaling 759,073 (45.2%) on the left bank and 919,279 (54.8%) on the right bank. Most fish were counted in one of the inshore strata; with the left bank inshore stratum accounting for 84.0% of all left bank counts and the right bank inshore stratum accounting for 98.0% of all right bank sonar counts (Appendices A1–A4).

Spatial and Temporal Distribution of Sonar Counts

From 8 June to 17 July, sockeye, Chinook, and chum salmon, were the primary species present. Sockeye, Chinook, and chum salmon passage counts varied daily by bank and strata through time. Peak daily passage in both the left bank inshore and offshore stratum occurred on 1 July (Table 1; Appendix A1 and Appendix A2). Peak daily passage counts on the right bank inshore stratum also occurred on 1 July while the offshore stratum peaked on 18 June (Table 1; Appendices A3–A6).

Hourly fish passage from 8 June through 17 July varied within and among strata during this period. Peak counts in the left bank inshore stratum varied, with the largest sonar counts occurring between 2200 and 0100 hours, and the lowest passage rate occurring at 1000 hours (Figure 2). The left bank offshore stratum experienced peak fish passage between 1500 and 1600 hours, with the lowest passage rates occurring in the morning between 0400 and 0500 hours and in the afternoon at 1300 and 1400 hours (Figure 2).

Counts within the right bank inshore strata experienced peak passage between 1600 and 1900 hours, and the lowest passage rates occurring between 1000 and 1100 hours (Figure 3). The right bank offshore stratum experienced peak passage at 1900 hours, with the lowest passage rates occurring at 0700 hours (Figure 3).

Escapement Sampling

In 2005, a total of 2,676 gillnet drifts were completed. The duration of each gillnet drift was approximately 2.5 minutes. The 20.6 cm, 15.2 cm, and 13.0 cm mesh gillnets caught 706, 1,640, and 1,804 salmon, respectively (Table 2). The total gillnet catch of 4,150 fish was composed of 1,984 sockeye salmon, 994 Chinook salmon, and 1,172 chum salmon. Most salmon were caught in the left and right bank inshore stratum (1,252) followed by the right offshore (996), and left offshore (650) strata (Table 2).

The 13.0 cm gillnet caught the greatest number of sockeye salmon (905), followed by the 15.2 cm (775), and 20.6 cm (304) mesh gillnets. Chinook salmon were captured predominantly in the 15.2 cm mesh gillnet (359), followed by the 13.0 cm mesh gillnet (325), and 20.6 cm mesh gillnet (310). Chum salmon were caught predominantly in both the 13.0 cm mesh gillnet (574), and 15.2 cm mesh gillnet (506), followed by the 20.6 cm mesh gillnet (92) (Table 2). Sockeye, Chinook, and chum salmon dominated the drift gillnet escapement sampling catch throughout June and July (Tables 3–6).

Estimates of Escapement

Salmon were enumerated past the sonar between 8 June and 17 July. The salmon escapement estimate for the Nushagak River in 2005 was 1,678,352 fish (Standard Error (SE)=32,932). This included an estimated 1,049,620 sockeye (SE=21,012), 172,708 Chinook (SE=14,446), and 456,024 chum (SE=20,841) salmon (Tables 7 and 8).

Sockeye Salmon

Sockeye salmon comprised 13% of the salmon passage on 8 June and 50.4% of the salmon passage on 17 July and ranged from a low of 173 on 11 June and a peak of 229,756 fish on 1 July (Tables 7 and 9, Figure 4). Fish passage varied by strata and time. The left bank escapement estimate of 474,041 fish was 45.2% of the total sockeye salmon escapement. The left bank inshore stratum escapement estimate of 459,255 was 96.9% of the left bank escapement. The left bank offshore stratum accounted for 3.1% of the left bank escapement with an estimated 14,787 sockeye salmon (Table 8). Peak daily passage by stratum occurred in the left bank inshore stratum between 21 June and 11 July, with the largest daily passage (122,979) occurring on 1 July.

The right bank escapement estimate of 575,579 fish was 54.8% of the total sockeye salmon escapement. The right bank inshore stratum escapement estimate of 571,951 sockeye salmon was 99.4% of the right bank escapement. The right bank offshore accounted for 0.6% of the right bank total escapement at 3,627 fish. Peak daily sockeye salmon passage on the right bank occurred in the inshore stratum between 18 June and 12 July, with the largest daily passage (102,494) occurring on 1 July.

Chinook Salmon

Chinook salmon comprised 74.1% of the salmon passage on 8 June and 3.8% of the passage on 17 July and ranged from a low of 166 fish on 9 July and a peak of 41,155 fish on 18 June (Table 7 and 10, Figure 5). Fish passage varied by strata and time. The left bank escapement estimate of 111,140 Chinook salmon was 64.4% of the total escapement (Table 8). The left bank inshore stratum escapement estimate of 36,226 Chinook salmon was 32.6% of the left bank escapement, with the largest daily passage (9,221) occurring on 18 June. The offshore stratum accounted for 67.4% of the left bank escapement, with an estimated 74,914 Chinook salmon. Peak daily left bank passage occurred in the offshore stratum on 19 June, with a passage of 8,167 fish.

The right bank escapement estimate of 61,568 Chinook salmon was 35.6% of the total Chinook salmon escapement. The right bank inshore stratum escapement estimate of 54,694 Chinook salmon was 88.8% of the right bank escapement. The right bank offshore stratum accounted for 11.2% of the right bank total escapement at 6,873 fish. Peak daily Chinook salmon passage on the right bank occurred in the inshore stratum between 18 and 24 June, with the largest daily passage (26,020) occurring on 18 June.

Chum Salmon

Chum salmon comprised 13.0% of the salmon passage on 8 June and 45.8% of the passage on 17 July and ranged from a low of 57 fish on 13 June to a peak of 77,821 fish on 18 June (Table 7 and 11, Figure 6). Fish salmon passage varied by strata and time. The left bank escapement estimate of 173,891 chum salmon was 38.1% of the total escapement (Table 8). The left bank inshore stratum escapement estimate of 142,062 chum salmon was 81.7% of the left bank

escapement. The offshore stratum accounted for 18.3% of the left bank escapement, with an estimated 31,829 chum salmon passing. Peak left bank passage occurred in the inshore stratum on 18 June, with a passage of 13,474 fish.

The right bank escapement estimate of 282,133 fish was 61.9% of the total chum salmon escapement. The right bank inshore stratum escapement estimate of 274,477 fish was 97.3% of the right bank escapement. The offshore stratum accounted for 2.7% of the right bank total with an estimated escapement of 7,655 chum salmon. Peak daily chum salmon passage on the right bank occurred in the inshore stratum between 18 June and 12 July, with the largest daily passage (57,142) occurring on 18 June.

Age, Sex, and Size Estimates

Sockeye salmon age, sex, and length composition were estimated based on 1,227 readable scales from 1,493 fish sampled during the season, from which 3 age composition estimates for the season were generated for sockeye salmon in 2005 (Table 12).

The dominant age classes for sockeye salmon during period one (8 June to 24 June) were age 1.3 (79.5%; 1999 brood year), and age 1.2 (13.1%; 2000 brood year). The sex composition of sockeye salmon during this time was 52.0% male and 48.0% female. The mean length by age ranged from 473 mm for age 1.2 to 579 mm for age 1.4 (Table 13). The dominant age classes during period 2 (25 June to 2 July) were age 1.3 (80.8%), and age 1.2 (10.7%). The sex composition of sockeye salmon during this time was 54.6% males to 45.4% females. The mean length by age ranged from 450 mm for age 0.2 to 595 mm for age 0.5. The dominate age classes during the third and final period (3 July to 24 July) were age 1.3 (74.6%) and age 1.2 (10.6%). The sex composition was 61.0% male and 39.0% female. Mean lengths ranged from 493 mm for age 1.2 to 630 mm for age 0.4. For all periods combined, the dominant age classes were age 1.3 (78.8%), and age 1.2 (11.2%). The overall sex composition of sockeye salmon was 55.7% male and 44.3% female. Mean lengths ranged from 481 mm for age 1.2 to 595 mm for age 0.4.

Chinook salmon age, sex and length composition were estimated based on 607 readable scales sampled from 694 fish during 2005 (Table 14). Three major age classes were present: age 1.2 (14.2%; 2001 brood year); age 1.3 (47.0%; 2000 brood year); and age 1.4 (37.9%; 1999 brood year). The sex composition of Chinook salmon was 59.1% male and 40.9% female. Mean lengths by age ranged from 559 mm for age 1.2 to 898 mm for age 1.5 Chinook salmon (Table 15).

Chum salmon age, sex and length composition were estimated based on 585 readable scales sampled from 668 fish sampled during 2005 (Table 16). The dominant age classes were age 0.3 (85.5%; 2001 brood year), followed by age 0.4 (14.2%; 2000 brood year). The sex composition of chum salmon was 63.9% male and 36.1% female. Mean lengths by age ranged from 510 mm for age 0.2 to 675 mm for age 0.5 fish (Table 17).

Genetic Sampling

A total of 413 genetic samples were collected from sockeye salmon passing the sonar site from 20 June to 16 July (Table 18). The samples were sent to the ADF&G Gene Conservation Lab in Anchorage for later analysis.

Environmental Data

Sonar operations were not affected by climatic conditions in 2005. Air and water temperature was slightly above average throughout the season (Table 19, Appendix B1).

BENDIX-DIDSON COMPARISON

2004

During the 2004 field season, the LR DIDSON was deployed on the right bank of the Nushagak River in a comparative study alongside the Bendix. A total of 1,344,193 DIDSON and 900,209 Bendix salmon were counted during daily paired counts between 17 June and 15 August (Figure 7, Appendix C1). The daily Bendix count deviated by -33.0% from the DIDSON counts for a total difference of 443,984 fish.

Sonar count distribution by right bank strata varied throughout the comparison study period. The total inshore Bendix count of 852,304 was 12.7% less than the DIDSON count of 976,728 fish (Appendix C2). The total right bank offshore Bendix count of 47,905 was 87.0% less than the DIDSON count of 367,465 fish (Appendix C3). Right bank daily and hourly counts for both systems are presented in Appendices C4 through C7.

Escapement counts by species for the right bank were compared. The sockeye escapement estimate of 296,436 produced by the Bendix was 11.1% greater than the count of 266,801 for DIDSON (Appendix C8). The inshore stratum Bendix count of 290,066 was 27.3% greater than the DIDSON count of 227,775 (Appendix C9). The total offshore Bendix count of 6,369 was 83.7% less than the DIDSON count of 39,025 fish (Appendix C9).

Chinook salmon escapement estimates were 49.8% or 35,513 less for Bendix (35,763) than for DIDSON (71,276) (Appendix C8). The total inshore Bendix count of 28,280 was 57.6% greater than the DIDSON count of 17,947 (Appendix C9). The offshore Bendix count of 7,483 was 86.0% less than the DIDSON count of 53,329 fish (Appendix C9).

Chum salmon escapement estimates were 8.3% or 16,222 less for Bendix (178,747) than for DIDSON (194,970) (Appendix C8). Total inshore Bendix count of 167,419 was 34.1% greater than the DIDSON count of 124,846 (Appendix C9). The offshore Bendix count of 11,329 was 83.8% less than the DIDSON count of 70,124 fish (Appendix C9).

Coho salmon escapement estimates were 58.1% or 85,350 less for Bendix (61,647) than for DIDSON (146,997) (Appendix C8). Total inshore Bendix count of 53,055 was 40.1% less than the DIDSON count of 88,587 (Appendix C9). The offshore Bendix count of 8,592 was 85.3% less than the DIDSON count of 58,410 (Appendix C9).

Pink escapement estimates were 50.7% or 336,534 less for Bendix (327,616) than for DIDSON (664,150) (Appendix C8). Total inshore Bendix count of 313,483 was 39.4% less than the DIDSON count of 517,574 (Appendix C9). The offshore Bendix count of 14,132 was 90.4% less than the DIDSON count of 146,576 fish (Appendix C9).

2005

During the 2005 field season, the LR DIDSON was again deployed on the right bank of the Nushagak River in a comparative study alongside the Bendix. A total of 915,354 Bendix and 1,022,202 DIDSON salmon were counted during daily paired counts between 10 June and 17 July (Figure 8, Appendix C10). The daily Bendix count deviated by -10.5% from the DIDSON counts for a total difference of 106,848 fish.

Sonar count distribution by right bank strata varied throughout the comparison study period. The total inshore Bendix count of 898,030 was 4.1% less than the DIDSON count of 936,369

(Appendix C11). The total right bank offshore Bendix count of 17,324 was 79.8% less than the DIDSON count of 85,833 (Appendix C12). Right bank daily and hourly counts for both systems are presented in Appendices C13 through C16.

Escapement counts by species for the right bank were compared. The sockeye salmon estimate of 586,402 produced by the Bendix was 9.5% lower than the DIDSON count of 647,694 (Appendix C17). The inshore Bendix count of 582,645 was 6.9% less than the DIDSON count of 625,752 (Appendix C18). The total offshore Bendix count of 3,757 was 82.9% less than the DIDSON count of 21,942 (Appendix C18).

Chinook salmon escapement estimates were 17.0% or 12,047 less for Bendix (58,799) than for DIDSON (70,845) (Appendix C17). The total inshore Bendix count of 52,669 was 15.6% greater than the DIDSON count of 45,564 (Appendix C18). The offshore Bendix count of 6,129 was 75.8% less than the DIDSON count of 25,281 (Appendix C18).

Chum salmon escapement estimates were 11.0% or 33,510 lower for Bendix (270,153) than for DIDSON (303,663) (Appendix C17). The total inshore Bendix count of 262,715 was 0.9% less than the DIDSON count of 265,053 (Appendix C18). The offshore Bendix count of 7,438 was 80.7% less than the DIDSON count of 38,610 (Appendix C18).

DISCUSSION

The purpose of this report was to document the escapement of select species of Pacific salmon into the Nushagak River using hydroacoustics and gillnetting. The 2005 season was successful in that it provided inseason escapement estimates of sockeye, Chinook and chum salmon. However, we did not meet all the objectives for this project. We met the desired levels of accuracy and precision for the estimates of escapement for sockeye and chum (Objective 1). However, the desired levels of precision and accuracy were not met for estimates of escapement for Chinook salmon.

The escapement estimate of 1,049,620 sockeye salmon had a 90% Confidence Interval (CI) of $\pm 21,012$ fish. This CI was within 3.3% of the escapement estimate. This escapement exceeded the escapement goal range of 340,000 to 760,000 sockeye salmon and was the largest since 1990. The escapement estimate of 172,708 Chinook salmon had a 90% CI of $\pm 14,446$ fish. This CI was within 13.7% of the escapement estimate. This escapement exceeded the inriver goal of 75,000 Chinook and was the largest since 1990. The escapement estimate of 456,024 chum salmon had a 90% CI of $\pm 20,841$ fish. This CI was within 4.6% of the escapement estimate. In 2005 there was not an official escapement goal for chum salmon in the Nushagak River; however, the escapement estimate of 456,024 did exceed the management objective of 190,000 chum salmon and was the second largest escapement since 1990. The cumulative chum escapement in 2005 was 155% of the 1990–2004 average (Table 11; Figure 6).

The timing of the sockeye, Chinook and chum salmon runs was early in 2005. Fifty percent of the sockeye run passed the sonar 2 days earlier than the historical average (Table 9; Figure 4). Fifty percent of the Chinook run passed the sonar 5 days earlier than the historical average (Table 10; Figure 5). Fifty percent of the chum salmon passed the sonar 4 days earlier than the historical average (Table 11; Figure 6).

Sampling efforts were adequate to estimate the age composition of sockeye, Chinook and chum salmon in 2005. A goal of 1,200 for the season was set for sockeye, which would allow age composition estimates for 3 time strata (early, middle and late) using roughly 400 samples each.

A total of 1,493 sockeye salmon were sampled producing 1,227 readable scales during 2005. Age compositions were estimated for an early sampling group ($n=375$) running through 24 June, a mid-run group running from 25 June through 2 July ($n=541$) and a late run group running from 3 through 20 July (Table 12). Age 1.3 dominated all 3 time periods, comprising 78.8% of the total run.

A sample size goal for Chinook salmon was set at 500 fish. A total of 694 Chinook salmon were sampled producing 607 readable scales during 2005. Age composition estimates were made for all the major age classes of Chinook salmon such that all the 90% CIs were within 5% of the age composition estimates (Table 14). Age 1.3 and 1.4 dominated with a combined 85% of the total run.

A sample size goal for chum salmon was set at 500 fish. A total of 668 chum salmon were sampled producing 585 readable scales during 2005. Age composition estimates were made for all the major age classes of chum salmon such that all the 90% CIs were within 5% of the age composition estimates (Table 16). Age 0.3 was dominant with 85.5% of the total run.

Estimates of the sex composition for sockeye, Chinook, and chum salmon were made during 2005 (Objective 3). The total proportion of males (55.7%) was greater than females (44.3%) for sockeye salmon in 2005 (Table 13). The ratio of males to females increased over the season from 1.08 early in the season to 1.56 in the late season. There were more males than females in Chinook (59.1% males; 40.9% females; Table 15), chum (63.9% males; 36.1% females; Table 15).

Estimates of mean length at age by sex were made for sockeye, Chinook, and chum salmon escapement during 2005 (Objective 4). Males were larger than females for sockeye salmon (mean length: 568 mm, males; 547 mm, females; Table 13). However, for Chinook salmon males were smaller than females (mean length: 709 mm, males; 799 mm, females; Table 15). Males were larger than females for Chum salmon (mean length: 611 mm, males; 566 m, females; Table 17).

Species passage by bank was compared with previous years (2002–2004). Sockeye salmon passage in 2005 was similar to the past 3 seasons, with 98.2% of the passage occurring in the left and right bank inshore stratum (Table 8). Sockeye salmon passage on the right bank inshore stratum the past 3 seasons has averaged 69.6% of the total sockeye salmon escapement.

Chinook salmon passage in 2005 was also similar to previous years, with 64.4% of the passage occurring in the left bank strata. Chinook salmon passage on the left bank the past 3 seasons has averaged 69.6% of the total Chinook salmon escapement.

Chum salmon passage in 2005 was also similar to previous years, with 91.3% of the passage occurring in the left and right bank inshore strata while averaging 93.1% of the passage from 2002 to 2004. The right bank inshore stratum chum passage rate observed in 2005 was 60.2%. This was similar to the previous 3 seasons, when chum salmon passage on the right bank inshore averaged 61.0% of the total chum escapement.

Bendix-DIDSON Comparison

Total Bendix counts were less than DIDSON counts during both years of the study. The Bendix count was 33.0% (443,984) less than the total count derived using DIDSON in 2004, while in 2005, the Bendix count was 10.5% (106,848) less than the total count derived using DIDSON. Total counts varied by species and strata in 2004 and 2005.

Sockeye salmon counts using Bendix were 11.1% (29,635) higher than the DIDSON count in 2004 and 9.5% (61,292) less than the DIDSON count in 2005. The largest difference in 2004 and

2005 occurred in the inshore area as a majority of sockeye salmon were counted in the inshore area.

Chinook salmon counts using Bendix were 49.8% (35,513) less than DIDSON in 2004, while Bendix was 17.0% (12,047) less than DIDSON in 2005. The largest differences in 2004 and 2005 occurred in the offshore strata.

Chum salmon counts from the Bendix were (8.3%) 16,222 less than DIDSON in 2004, while Bendix was (11.0%) 33,510 less than DIDSON in 2005. In 2004 and 2005 a majority of chum salmon were counted in the inshore area.

The primary reason for the differences between Bendix and DIDSON counts appear to be due to the increased fish detectability of the DIDSON. The multi-beam DIDSON offers superior detection capabilities over the conventional single narrow beam of Bendix transducers when aimed along an uneven or nonlinear substrate because 1) the DIDSON beam can be aimed into the substrate because its bottom-subtraction feature can remove stationary structure from the image and 2) the wider vertical beam offers greater coverage of the water column, both horizontally and vertically (Burwen et al. 2007).

Operation of the Bendix, specifically aiming and calibration, may have contributed to part of the difference in the counts between the 2 sonar types. Proper aiming of the Bendix transducers is crucial to its effective operation. A transducer that is aimed off a couple of degrees can cause fish to not be counted. Keeping the transducer aimed without any type of interannual attitude sensor is difficult. This uncertainty requires that operators conduct daily calibrations particularly when encountering varying passage rates.

The high resolution (near video) image produced by the DIDSON is a significant advantage. This makes the DIDSON much easier to aim than the Bendix and has the additional advantage of allowing the user to discern the direction of fish travel, which is not possible with the Bendix. Finally, the ability to store raw data files from the DIDSON allows review at a later date, while the Bendix system only produces a final count with no mechanism to store the raw signal.

RECOMMENDATIONS

We recommend that the LR DIDSON replace the Bendix system for estimating salmon escapement on the right bank in 2006. This should be accompanied with additional DIDSON training for all sonar personnel. Finally, we recommend additional comparisons be conducted between Bendix and DIDSON (both SR and LR) to provide a better understanding of how the 2 systems compare in the future.

ACKNOWLEDGEMENTS

I wish to thank the following Alaska Department of Fish and Game, Division of Commercial Fisheries personnel for contributing to this report. The Nushagak River sonar crew consisted of: Konrad Mittlestadt (Crew Leader); Luc Hegg, Jeanette LeClair, Alex Pennino, and Colton Lipka, Fish and Wildlife Technicians; Iris Bowers, BBEDC Student Intern; and Suzanne Maxwell, Regional Sonar Biologist. Logistical support was provided by Tim Sands, Charlotte Westing, Karen Brito, Phil Carpenter, and Simon Prennace. Lowell Fair, Tim Baker, Scott Raborn, and Suzanne Maxwell provided critical review of this manuscript.

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TABLES AND FIGURES

Table 1.—Daily inshore and offshore sonar counts of salmon by bank, Nushagak River sonar project, 2005.

Date	Left Bank			Right Bank		
	Inshore	Offshore	Cumulative	Inshore	Offshore	Cumulative
6/08	1,197	2,802	3,999	2,101	261	2,362
6/09	321	340	661	553	384	937
6/10	405	564	969	720	415	1,135
6/11	230	389	619	809	247	1,056
6/12	290	400	690	961	381	1,342
6/13	248	497	745	915	226	1,141
6/14	272	472	744	1,344	268	1,612
6/15	1,065	2,035	3,101	5,059	197	5,256
6/16	623	841	1,464	1,362	122	1,484
6/17	399	575	974	2,569	222	2,791
6/18	25,072	12,475	37,547	98,747	3,502	102,249
6/19	15,618	8,167	23,784	62,904	848	63,752
6/20	10,140	3,948	14,088	20,290	515	20,805
6/21	23,550	7,209	30,759	45,965	723	46,688
6/22	19,889	4,347	24,236	40,458	963	41,421
6/23	19,401	5,635	25,036	33,336	562	33,898
6/24	38,260	5,524	43,784	52,585	646	53,231
6/25	23,725	4,498	28,223	34,951	561	35,512
6/26	10,255	5,073	15,328	25,078	286	25,364
6/27	7,424	3,500	10,924	18,998	223	19,221
6/28	4,189	1,993	6,182	9,411	106	9,517
6/29	7,304	1,302	8,606	9,967	61	10,028
6/30	9,905	3,517	13,422	39,583	199	39,782
7/01	135,125	12,518	147,643	105,854	573	106,427
7/02	102,174	6,343	108,517	74,228	856	75,084
7/03	29,157	5,093	34,250	26,883	582	27,465
7/04	15,979	2,699	18,679	18,226	558	18,784
7/05	6,921	1,745	8,666	11,803	284	12,087
7/06	8,499	2,104	10,603	12,649	317	12,966
7/07	17,336	2,183	19,519	20,582	307	20,889
7/08	25,217	1,551	26,768	22,071	284	22,355
7/09	16,867	1,423	18,290	10,853	235	11,088
7/10	20,449	2,042	22,491	16,313	360	16,673
7/11	24,507	2,945	27,452	18,199	375	18,574
7/12	5,095	1,528	6,624	17,203	766	17,969
7/13	2,967	921	3,889	5,449	144	5,593
7/14	3,386	613	4,000	4,515	194	4,709
7/15	2,281	469	2,750	3,673	134	3,807
7/16	986	829	1,815	5,107	93	5,200
7/17	812	419	1,231	18,849	176	19,025
Total	637,543	121,530	759,073	901,123	18,156	919,279

Table 2.—Drift gillnet catch by mesh size and salmon species, Nushagak River sonar project, 8 June through 17 July, 2005.

Gillnet Mesh Size	Species	Drift Stratum Number					
		Left Bank			Right Bank		
		Inshore	Offshore	Total	Inshore	Offshore	Total
13.0 cm	Sockeye	368	47	415	359	131	490
	Chinook	39	118	157	39	129	168
	Chum	146	60	206	181	187	368
15.2 cm	Sockeye	317	45	362	320	93	413
	Chinook	56	141	197	27	135	162
	Chum	142	79	221	133	152	285
20.6 cm	Sockeye	126	9	135	132	37	169
	Chinook	35	141	176	30	104	134
	Chum	23	10	33	31	28	59
All Meshes	Sockeye	811	101	912	811	261	1,072
	Chinook	130	400	530	96	368	464
	Chum	311	149	460	345	367	712

Table 3.—Left bank inshore stratum escapement sampling catch proportions by date, drift session, and salmon species, 2005.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/8	1	4	0.50	0.25	0.25	0.00	0.00
6/8	3	1	1.00	0.00	0.00	0.00	0.00
6/9	1	2	1.00	0.00	0.00	0.00	0.00
6/9	3	4	1.00	0.00	0.00	0.00	0.00
6/10	1	2	1.00	0.00	0.00	0.00	0.00
6/10	3	2	1.00	0.00	0.00	0.00	0.00
6/11	1	2	1.00	0.00	0.00	0.00	0.00
6/11	3	1	1.00	0.00	0.00	0.00	0.00
6/12	1	2	1.00	0.00	0.00	0.00	0.00
6/14	1	2	0.00	0.00	1.00	0.00	0.00
6/14	3	2	0.50	0.50	0.00	0.00	0.00
6/15	1	7	0.43	0.43	0.14	0.00	0.00
6/15	3	6	0.83	0.00	0.17	0.00	0.00
6/16	1	3	0.33	0.67	0.00	0.00	0.00
6/16	2	3	0.00	0.33	0.67	0.00	0.00
6/16	3	2	0.50	0.50	0.00	0.00	0.00
6/17	1	1	1.00	0.00	0.00	0.00	0.00
6/17	3	3	0.67	0.00	0.33	0.00	0.00
6/18	1	5	0.80	0.00	0.20	0.00	0.00
6/18	2	17	0.12	0.29	0.59	0.00	0.00
6/18	3	19	0.63	0.05	0.32	0.00	0.00
6/19	1	15	0.53	0.20	0.27	0.00	0.00
6/19	2	9	0.22	0.67	0.11	0.00	0.00
6/19	3	17	0.00	0.82	0.18	0.00	0.00
6/20	1	21	0.29	0.43	0.29	0.00	0.00
6/20	2	20	0.10	0.85	0.05	0.00	0.00
6/20	3	18	0.17	0.67	0.17	0.00	0.00
6/21	1	14	0.07	0.57	0.36	0.00	0.00
6/21	2	14	0.00	0.86	0.14	0.00	0.00
6/21	3	18	0.00	0.89	0.11	0.00	0.00
6/22	1	8	0.13	0.38	0.50	0.00	0.00
6/22	2	10	0.30	0.50	0.20	0.00	0.00
6/22	3	16	0.31	0.06	0.63	0.00	0.00
6/23	1	14	0.14	0.36	0.50	0.00	0.00
6/23	2	6	0.00	0.50	0.50	0.00	0.00
6/23	3	20	0.05	0.30	0.65	0.00	0.00
6/24	1	1	0.00	0.00	1.00	0.00	0.00
6/24	2	27	0.04	0.81	0.15	0.00	0.00
6/24	3	26	0.04	0.73	0.23	0.00	0.00

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Table 3.—Page 2 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/25	1	17	0.06	0.59	0.35	0.00	0.00
6/25	2	34	0.00	0.85	0.15	0.00	0.00
6/25	3	11	0.00	1.00	0.00	0.00	0.00
6/26	1	8	0.13	0.63	0.25	0.00	0.00
6/26	2	9	0.00	0.11	0.89	0.00	0.00
6/26	3	10	0.10	0.50	0.40	0.00	0.00
6/27	1	3	0.33	0.33	0.33	0.00	0.00
6/27	2	6	0.00	0.83	0.17	0.00	0.00
6/27	3	3	0.33	0.00	0.67	0.00	0.00
6/28	1	11	0.27	0.27	0.45	0.00	0.00
6/28	2	6	0.17	0.00	0.83	0.00	0.00
6/28	3	2	0.50	0.50	0.00	0.00	0.00
6/29	1	12	0.42	0.42	0.17	0.00	0.00
6/29	2	2	0.50	0.00	0.50	0.00	0.00
6/29	3	1	0.00	1.00	0.00	0.00	0.00
6/30	1	20	0.05	0.75	0.20	0.00	0.00
6/30	2	10	0.10	0.70	0.20	0.00	0.00
6/30	3	9	0.00	0.89	0.11	0.00	0.00
7/1	1	35	0.00	0.86	0.14	0.00	0.00
7/1	2	38	0.00	0.95	0.05	0.00	0.00
7/1	3	39	0.00	0.97	0.03	0.00	0.00
7/2	1	35	0.09	0.89	0.03	0.00	0.00
7/2	2	43	0.00	0.98	0.02	0.00	0.00
7/2	3	22	0.00	1.00	0.00	0.00	0.00
7/3	1	16	0.00	0.94	0.06	0.00	0.00
7/3	2	11	0.00	1.00	0.00	0.00	0.00
7/3	3	6	0.00	0.83	0.17	0.00	0.00
7/4	1	16	0.13	0.31	0.56	0.00	0.00
7/4	2	18	0.00	0.56	0.44	0.00	0.00
7/4	3	24	0.00	0.54	0.46	0.00	0.00
7/5	1	8	0.25	0.38	0.38	0.00	0.00
7/5	2	10	0.10	0.40	0.50	0.00	0.00
7/5	3	13	0.08	0.31	0.62	0.00	0.00
7/6	1	11	0.09	0.82	0.09	0.00	0.00
7/6	2	8	0.00	0.38	0.63	0.00	0.00
7/6	3	18	0.06	0.22	0.72	0.00	0.00
7/7	1	8	0.13	0.38	0.50	0.00	0.00
7/7	2	14	0.07	0.93	0.00	0.00	0.00
7/7	3	13	0.00	0.92	0.08	0.00	0.00
7/8	1	17	0.00	0.82	0.18	0.00	0.00
7/8	2	33	0.03	0.91	0.06	0.00	0.00
7/8	3	16	0.00	0.94	0.06	0.00	0.00
7/9	1	11	0.00	0.82	0.18	0.00	0.00
7/9	2	17	0.00	1.00	0.00	0.00	0.00
7/9	3	19	0.00	1.00	0.00	0.00	0.00

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Table 3.—Page 3 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
7/10	1	17	0.06	0.76	0.18	0.00	0.00
7/10	2	16	0.00	0.63	0.38	0.00	0.00
7/10	3	25	0.04	0.48	0.48	0.00	0.00
7/11	1	13	0.08	0.85	0.08	0.00	0.00
7/11	2	14	0.21	0.36	0.43	0.00	0.00
7/11	3	18	0.00	0.17	0.83	0.00	0.00
7/12	1	18	0.17	0.33	0.50	0.00	0.00
7/12	2	12	0.00	0.83	0.17	0.00	0.00
7/12	3	8	0.00	0.50	0.50	0.00	0.00
7/13	1	9	0.00	1.00	0.00	0.00	0.00
7/13	2	2	0.00	0.50	0.50	0.00	0.00
7/13	3	6	0.00	0.83	0.17	0.00	0.00
7/14	1	8	0.00	1.00	0.00	0.00	0.00
7/14	2	2	1.00	0.00	0.00	0.00	0.00
7/14	3	4	0.00	0.75	0.25	0.00	0.00
7/15	1	5	0.00	1.00	0.00	0.00	0.00
7/15	2	2	0.00	1.00	0.00	0.00	0.00
7/15	3	4	0.25	0.25	0.50	0.00	0.00
7/16	1	5	0.00	0.40	0.60	0.00	0.00
7/16	3	7	0.00	0.14	0.86	0.00	0.00

Table 4.—Left bank offshore stratum escapement sampling catch proportions by date, drift session, and salmon species, 2005.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/8	1	11	0.82	0.09	0.09	0.00	0.00
6/8	3	6	1.00	0.00	0.00	0.00	0.00
6/9	1	1	1.00	0.00	0.00	0.00	0.00
6/10	3	1	1.00	0.00	0.00	0.00	0.00
6/11	1	4	1.00	0.00	0.00	0.00	0.00
6/11	3	1	1.00	0.00	0.00	0.00	0.00
6/12	1	1	1.00	0.00	0.00	0.00	0.00
6/13	1	2	1.00	0.00	0.00	0.00	0.00
6/13	2	2	1.00	0.00	0.00	0.00	0.00
6/14	1	2	1.00	0.00	0.00	0.00	0.00
6/14	3	1	1.00	0.00	0.00	0.00	0.00
6/15	1	2	1.00	0.00	0.00	0.00	0.00
6/16	1	2	0.50	0.00	0.50	0.00	0.00
6/16	2	1	1.00	0.00	0.00	0.00	0.00
6/17	1	1	1.00	0.00	0.00	0.00	0.00
6/18	1	9	0.67	0.11	0.22	0.00	0.00
6/18	2	5	0.40	0.00	0.60	0.00	0.00
6/18	3	4	0.25	0.50	0.25	0.00	0.00
6/19	2	13	1.00	0.00	0.00	0.00	0.00
6/19	3	7	1.00	0.00	0.00	0.00	0.00
6/20	1	16	1.00	0.00	0.00	0.00	0.00
6/20	2	14	0.93	0.07	0.00	0.00	0.00
6/20	3	3	1.00	0.00	0.00	0.00	0.00
6/21	1	13	1.00	0.00	0.00	0.00	0.00
6/21	2	7	0.43	0.00	0.57	0.00	0.00
6/21	3	5	0.40	0.00	0.60	0.00	0.00
6/22	1	2	0.50	0.00	0.50	0.00	0.00
6/22	2	4	0.50	0.25	0.25	0.00	0.00
6/22	3	1	1.00	0.00	0.00	0.00	0.00
6/23	1	4	1.00	0.00	0.00	0.00	0.00
6/23	2	3	0.67	0.00	0.33	0.00	0.00
6/23	3	3	0.67	0.00	0.33	0.00	0.00
6/24	1	6	0.50	0.50	0.00	0.00	0.00
6/24	2	11	0.64	0.27	0.09	0.00	0.00
6/24	3	3	1.00	0.00	0.00	0.00	0.00
6/25	1	11	0.45	0.09	0.45	0.00	0.00
6/25	2	6	0.83	0.00	0.17	0.00	0.00
6/25	3	10	0.90	0.10	0.00	0.00	0.00
6/26	1	17	0.59	0.00	0.41	0.00	0.00
6/26	2	5	0.60	0.00	0.40	0.00	0.00
6/26	3	7	0.57	0.00	0.43	0.00	0.00
6/27	1	11	0.36	0.00	0.64	0.00	0.00
6/27	2	10	0.50	0.10	0.40	0.00	0.00
6/27	3	3	0.33	0.00	0.67	0.00	0.00

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Table 4.—Page 2 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/28	2	5	0.40	0.00	0.60	0.00	0.00
6/28	3	4	0.75	0.00	0.25	0.00	0.00
6/29	1	4	0.75	0.00	0.25	0.00	0.00
6/29	2	2	1.00	0.00	0.00	0.00	0.00
6/29	3	2	1.00	0.00	0.00	0.00	0.00
6/30	1	1	1.00	0.00	0.00	0.00	0.00
6/30	2	1	1.00	0.00	0.00	0.00	0.00
6/30	3	2	0.50	0.50	0.00	0.00	0.00
7/1	1	23	0.52	0.17	0.30	0.00	0.00
7/1	2	18	0.22	0.44	0.33	0.00	0.00
7/1	3	15	0.67	0.20	0.13	0.00	0.00
7/2	1	21	0.76	0.14	0.10	0.00	0.00
7/2	2	25	0.36	0.52	0.12	0.00	0.00
7/2	3	20	0.15	0.60	0.25	0.00	0.00
7/3	1	23	0.74	0.13	0.13	0.00	0.00
7/3	2	16	0.81	0.13	0.06	0.00	0.00
7/3	3	9	0.56	0.00	0.44	0.00	0.00
7/4	1	18	0.94	0.00	0.06	0.00	0.00
7/4	2	10	0.50	0.10	0.40	0.00	0.00
7/4	3	3	0.33	0.67	0.00	0.00	0.00
7/5	1	13	0.69	0.15	0.15	0.00	0.00
7/5	2	10	0.20	0.40	0.40	0.00	0.00
7/5	3	1	1.00	0.00	0.00	0.00	0.00
7/6	1	4	1.00	0.00	0.00	0.00	0.00
7/6	2	5	0.60	0.00	0.40	0.00	0.00
7/6	3	6	1.00	0.00	0.00	0.00	0.00
7/7	1	5	0.60	0.20	0.20	0.00	0.00
7/7	2	4	0.50	0.00	0.50	0.00	0.00
7/7	3	7	0.86	0.00	0.14	0.00	0.00
7/8	1	8	0.38	0.50	0.13	0.00	0.00
7/8	2	10	0.50	0.10	0.40	0.00	0.00
7/8	3	15	0.27	0.40	0.33	0.00	0.00
7/9	1	3	0.33	0.33	0.33	0.00	0.00
7/9	2	3	0.33	0.33	0.33	0.00	0.00
7/9	3	8	0.00	0.50	0.50	0.00	0.00
7/10	1	3	0.67	0.00	0.33	0.00	0.00
7/10	2	3	0.00	0.33	0.67	0.00	0.00
7/10	3	6	0.00	0.17	0.83	0.00	0.00
7/11	1	1	1.00	0.00	0.00	0.00	0.00
7/11	2	4	1.00	0.00	0.00	0.00	0.00
7/11	3	2	0.50	0.00	0.50	0.00	0.00
7/12	1	11	0.27	0.27	0.45	0.00	0.00
7/12	2	1	1.00	0.00	0.00	0.00	0.00
7/12	3	5	0.00	0.40	0.60	0.00	0.00

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Table 4.—Page 3 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
7/13	2	6	0.83	0.00	0.17	0.00	0.00
7/13	3	3	1.00	0.00	0.00	0.00	0.00
7/14	1	6	0.67	0.17	0.17	0.00	0.00
7/14	2	5	0.60	0.20	0.20	0.00	0.00
7/14	3	2	0.00	0.50	0.50	0.00	0.00
7/15	1	1	0.00	0.00	1.00	0.00	0.00
7/15	2	1	1.00	0.00	0.00	0.00	0.00
7/15	3	3	0.00	0.00	1.00	0.00	0.00
7/16	3	3	0.67	0.00	0.33	0.00	0.00

Table 5.—Right bank inshore stratum escapement sampling catch proportions by date, drift session, and salmon species, 2005.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/8	1	3	0.67	0.00	0.33	0.00	0.00
6/8	3	2	0.50	0.50	0.00	0.00	0.00
6/9	1	1	1.00	0.00	0.00	0.00	0.00
6/9	3	2	0.50	0.50	0.00	0.00	0.00
6/10	3	1	0.00	0.00	1.00	0.00	0.00
6/11	3	4	0.25	0.25	0.50	0.00	0.00
6/12	1	5	0.40	0.20	0.40	0.00	0.00
6/13	3	7	0.57	0.29	0.14	0.00	0.00
6/14	1	2	0.00	0.00	1.00	0.00	0.00
6/14	3	5	0.40	0.60	0.00	0.00	0.00
6/15	1	6	0.17	0.33	0.50	0.00	0.00
6/15	3	5	0.00	0.20	0.80	0.00	0.00
6/16	1	5	0.00	1.00	0.00	0.00	0.00
6/16	2	7	0.29	0.57	0.14	0.00	0.00
6/16	3	6	0.00	1.00	0.00	0.00	0.00
6/17	1	5	0.20	0.60	0.20	0.00	0.00
6/17	3	11	0.00	0.27	0.73	0.00	0.00
6/18	1	19	0.47	0.32	0.21	0.00	0.00
6/18	2	29	0.17	0.28	0.55	0.00	0.00
6/18	3	45	0.38	0.07	0.56	0.00	0.00
6/19	1	20	0.25	0.50	0.25	0.00	0.00
6/19	2	29	0.00	0.62	0.38	0.00	0.00
6/19	3	8	0.38	0.50	0.13	0.00	0.00
6/20	1	25	0.32	0.60	0.08	0.00	0.00
6/20	2	20	0.05	0.60	0.35	0.00	0.00
6/20	3	25	0.00	0.64	0.36	0.00	0.00
6/21	1	21	0.05	0.52	0.43	0.00	0.00
6/21	2	26	0.08	0.58	0.35	0.00	0.00
6/21	3	28	0.07	0.64	0.29	0.00	0.00
6/22	1	15	0.13	0.47	0.40	0.00	0.00
6/22	2	14	0.14	0.21	0.64	0.00	0.00
6/22	3	20	0.05	0.60	0.35	0.00	0.00
6/23	1	21	0.14	0.67	0.19	0.00	0.00
6/23	2	13	0.00	0.38	0.62	0.00	0.00
6/23	3	17	0.12	0.53	0.35	0.00	0.00
6/24	1	24	0.04	0.58	0.38	0.00	0.00
6/24	2	19	0.00	0.84	0.16	0.00	0.00
6/24	3	17	0.06	0.76	0.18	0.00	0.00
6/25	1	18	0.06	0.50	0.44	0.00	0.00
6/25	2	18	0.00	0.78	0.22	0.00	0.00
6/25	3	16	0.00	1.00	0.00	0.00	0.00
6/26	2	12	0.00	0.75	0.25	0.00	0.00
6/26	3	12	0.00	0.75	0.25	0.00	0.00

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Table 5.—Page 2 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/27	1	5	0.00	1.00	0.00	0.00	0.00
6/27	2	10	0.00	0.40	0.60	0.00	0.00
6/27	3	9	0.00	0.44	0.56	0.00	0.00
6/28	1	9	0.00	0.56	0.44	0.00	0.00
6/28	2	7	0.00	0.29	0.71	0.00	0.00
6/28	3	12	0.00	0.92	0.08	0.00	0.00
6/29	1	10	0.10	0.80	0.10	0.00	0.00
6/29	2	17	0.00	0.82	0.18	0.00	0.00
6/29	3	8	0.00	0.75	0.25	0.00	0.00
6/30	1	10	0.00	0.70	0.30	0.00	0.00
6/30	2	10	0.10	0.60	0.30	0.00	0.00
6/30	3	16	0.00	0.56	0.44	0.00	0.00
7/1	1	24	0.00	0.96	0.04	0.00	0.00
7/1	2	27	0.00	0.96	0.04	0.00	0.00
7/1	3	28	0.00	1.00	0.00	0.00	0.00
7/2	1	29	0.00	0.97	0.03	0.00	0.00
7/2	2	25	0.00	0.96	0.04	0.00	0.00
7/2	3	12	0.00	1.00	0.00	0.00	0.00
7/3	1	4	0.00	0.50	0.50	0.00	0.00
7/3	2	17	0.00	0.94	0.06	0.00	0.00
7/3	3	4	0.00	1.00	0.00	0.00	0.00
7/4	1	10	0.10	0.50	0.40	0.00	0.00
7/4	2	11	0.00	0.91	0.09	0.00	0.00
7/4	3	13	0.00	0.69	0.31	0.00	0.00
7/5	1	4	0.25	0.75	0.00	0.00	0.00
7/5	2	15	0.13	0.80	0.07	0.00	0.00
7/5	3	10	0.00	0.80	0.20	0.00	0.00
7/6	1	10	0.00	0.70	0.30	0.00	0.00
7/6	2	13	0.00	0.85	0.15	0.00	0.00
7/6	3	14	0.00	0.86	0.14	0.00	0.00
7/7	1	12	0.00	0.75	0.25	0.00	0.00
7/7	2	3	0.00	0.67	0.33	0.00	0.00
7/7	3	12	0.00	0.50	0.50	0.00	0.00
7/8	1	12	0.00	0.92	0.08	0.00	0.00
7/8	2	12	0.00	0.92	0.08	0.00	0.00
7/8	3	3	0.00	0.67	0.33	0.00	0.00
7/9	1	6	0.00	0.83	0.17	0.00	0.00
7/9	2	2	0.00	1.00	0.00	0.00	0.00
7/9	3	10	0.00	0.70	0.30	0.00	0.00
7/10	1	6	0.00	0.83	0.17	0.00	0.00
7/10	2	13	0.00	0.62	0.38	0.00	0.00
7/10	3	15	0.00	0.47	0.53	0.00	0.00
7/11	1	13	0.08	0.77	0.15	0.00	0.00
7/11	2	9	0.00	0.67	0.33	0.00	0.00
7/11	3	14	0.07	0.50	0.43	0.00	0.00

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Table 5.–Page 3 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
7/12	2	13	0.00	0.62	0.38	0.00	0.00
7/12	3	9	0.00	0.56	0.44	0.00	0.00
7/13	1	8	0.00	0.88	0.13	0.00	0.00
7/13	2	8	0.00	1.00	0.00	0.00	0.00
7/13	3	9	0.00	0.89	0.11	0.00	0.00
7/14	1	5	0.00	1.00	0.00	0.00	0.00
7/14	2	4	0.00	1.00	0.00	0.00	0.00
7/14	3	3	0.33	0.67	0.00	0.00	0.00
7/15	1	5	0.00	0.80	0.20	0.00	0.00
7/15	2	2	0.00	1.00	0.00	0.00	0.00
7/15	3	2	0.00	0.50	0.50	0.00	0.00
7/16	1	15	0.00	0.47	0.53	0.00	0.00
7/16	3	8	0.13	0.63	0.25	0.00	0.00

Table 6.—Right bank offshore stratum escapement sampling catch proportions by date, drift session, and salmon species, 2005.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/8	1	3	1.00	0.00	0.00	0.00	0.00
6/8	3	3	1.00	0.00	0.00	0.00	0.00
6/9	1	1	1.00	0.00	0.00	0.00	0.00
6/9	3	2	0.50	0.00	0.50	0.00	0.00
6/10	1	2	1.00	0.00	0.00	0.00	0.00
6/10	3	2	1.00	0.00	0.00	0.00	0.00
6/11	3	1	1.00	0.00	0.00	0.00	0.00
6/12	1	3	0.67	0.00	0.33	0.00	0.00
6/12	3	5	0.80	0.00	0.20	0.00	0.00
6/13	1	1	0.00	0.00	1.00	0.00	0.00
6/13	2	1	0.00	0.00	1.00	0.00	0.00
6/13	3	2	0.00	1.00	0.00	0.00	0.00
6/14	1	2	1.00	0.00	0.00	0.00	0.00
6/14	3	4	1.00	0.00	0.00	0.00	0.00
6/15	1	2	1.00	0.00	0.00	0.00	0.00
6/15	3	3	1.00	0.00	0.00	0.00	0.00
6/16	1	2	0.50	0.00	0.50	0.00	0.00
6/16	2	1	0.00	1.00	0.00	0.00	0.00
6/17	3	1	1.00	0.00	0.00	0.00	0.00
6/18	1	14	0.07	0.29	0.64	0.00	0.00
6/18	2	21	0.33	0.00	0.67	0.00	0.00
6/18	3	14	0.79	0.00	0.21	0.00	0.00
6/19	1	21	0.71	0.05	0.24	0.00	0.00
6/19	2	20	0.85	0.00	0.15	0.00	0.00
6/19	3	15	0.13	0.27	0.60	0.00	0.00
6/20	1	16	0.88	0.06	0.06	0.00	0.00
6/20	2	27	0.78	0.04	0.19	0.00	0.00
6/20	3	26	0.88	0.04	0.08	0.00	0.00
6/21	1	21	0.52	0.05	0.43	0.00	0.00
6/21	2	20	0.45	0.15	0.40	0.00	0.00
6/21	3	21	0.48	0.24	0.29	0.00	0.00
6/22	1	14	0.21	0.43	0.36	0.00	0.00
6/22	2	4	0.25	0.25	0.50	0.00	0.00
6/22	3	8	0.25	0.25	0.50	0.00	0.00
6/23	1	8	0.88	0.00	0.13	0.00	0.00
6/23	2	8	0.75	0.00	0.25	0.00	0.00
6/23	3	9	0.11	0.44	0.44	0.00	0.00
6/24	1	11	0.18	0.73	0.09	0.00	0.00
6/24	2	8	0.13	0.25	0.63	0.00	0.00
6/24	3	9	0.33	0.22	0.44	0.00	0.00
6/25	1	11	0.09	0.45	0.45	0.00	0.00
6/25	2	16	0.56	0.06	0.38	0.00	0.00
6/25	3	21	0.38	0.29	0.33	0.00	0.00

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Table 6.—Page 2 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
6/26	2	9	0.11	0.11	0.78	0.00	0.00
6/26	3	13	0.00	0.08	0.92	0.00	0.00
6/27	1	18	0.39	0.06	0.56	0.00	0.00
6/27	2	23	0.39	0.00	0.61	0.00	0.00
6/27	3	15	0.13	0.13	0.73	0.00	0.00
6/28	1	7	0.86	0.00	0.14	0.00	0.00
6/28	2	7	0.71	0.14	0.14	0.00	0.00
6/28	3	3	0.00	0.33	0.67	0.00	0.00
6/29	1	17	0.65	0.12	0.24	0.00	0.00
6/29	2	7	0.14	0.57	0.29	0.00	0.00
6/29	3	5	0.40	0.60	0.00	0.00	0.00
6/30	1	7	0.14	0.29	0.57	0.00	0.00
6/30	2	5	0.20	0.40	0.40	0.00	0.00
6/30	3	11	0.27	0.64	0.09	0.00	0.00
7/1	1	29	0.55	0.14	0.31	0.00	0.00
7/1	2	20	0.20	0.75	0.05	0.00	0.00
7/1	3	22	0.36	0.32	0.32	0.00	0.00
7/2	1	15	0.40	0.20	0.40	0.00	0.00
7/2	2	20	0.00	0.65	0.35	0.00	0.00
7/2	3	25	0.04	0.44	0.52	0.00	0.00
7/3	1	13	0.08	0.23	0.69	0.00	0.00
7/3	2	14	0.43	0.21	0.36	0.00	0.00
7/3	3	5	0.20	0.20	0.60	0.00	0.00
7/4	1	10	0.80	0.20	0.00	0.00	0.00
7/4	2	10	0.20	0.50	0.30	0.00	0.00
7/4	3	12	0.00	0.08	0.92	0.00	0.00
7/5	1	6	0.00	0.50	0.50	0.00	0.00
7/5	2	4	0.25	0.25	0.50	0.00	0.00
7/5	3	6	0.50	0.50	0.00	0.00	0.00
7/6	1	8	0.13	0.75	0.13	0.00	0.00
7/6	2	3	0.33	0.67	0.00	0.00	0.00
7/6	3	8	0.25	0.38	0.38	0.00	0.00
7/7	1	12	0.33	0.25	0.42	0.00	0.00
7/7	2	9	0.33	0.33	0.33	0.00	0.00
7/7	3	15	0.00	0.73	0.27	0.00	0.00
7/8	1	9	0.11	0.67	0.22	0.00	0.00
7/8	2	17	0.06	0.47	0.47	0.00	0.00
7/8	3	21	0.05	0.57	0.38	0.00	0.00
7/9	1	7	0.00	0.57	0.43	0.00	0.00
7/9	2	6	0.17	0.50	0.33	0.00	0.00
7/9	3	12	0.08	0.67	0.25	0.00	0.00
7/10	1	4	0.00	0.50	0.50	0.00	0.00
7/10	2	5	0.40	0.20	0.40	0.00	0.00
7/10	3	14	0.21	0.21	0.57	0.00	0.00

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Table 6.—Page 3 of 3.

Date	Drift Session	Catch	Proportion of Catch				
			Sockeye	Chinook	Chum	Coho	Pink
7/11	2	9	0.11	0.00	0.89	0.00	0.00
7/11	3	11	0.18	0.18	0.64	0.00	0.00
7/12	1	3	0.33	0.67	0.00	0.00	0.00
7/12	3	6	0.50	0.00	0.50	0.00	0.00
7/13	1	1	1.00	0.00	0.00	0.00	0.00
7/13	2	7	0.14	0.43	0.43	0.00	0.00
7/13	3	2	0.00	1.00	0.00	0.00	0.00
7/14	1	4	0.00	0.75	0.25	0.00	0.00
7/14	2	2	0.00	1.00	0.00	0.00	0.00
7/14	3	7	0.29	0.43	0.29	0.00	0.00
7/15	1	1	1.00	0.00	0.00	0.00	0.00
7/15	2	3	0.00	0.33	0.67	0.00	0.00
7/16	1	2	1.00	0.00	0.00	0.00	0.00
7/16	3	4	0.00	0.25	0.75	0.00	0.00

Table 7.-Final daily and cumulative escapement estimates by salmon species, Nushagak River sonar project, 2005.

Date	Sockeye		Chinook		Chum		Total	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/08	824	824	4,712	4,712	824	824	6,361	6,361
6/09	175	999	1,336	6,048	87	912	1,598	7,959
6/10	196	1,195	1,712	7,759	196	1,108	2,104	10,063
6/11	173	1,369	981	8,741	520	1,628	1,675	11,738
6/12	192	1,561	1,379	10,120	461	2,089	2,032	13,769
6/13	449	2,010	1,381	11,500	57	2,145	1,886	15,655
6/14	365	2,374	1,263	12,763	729	2,874	2,356	18,012
6/15	1,568	3,942	3,323	16,086	3,465	6,340	8,357	26,368
6/16	1,793	5,736	987	17,073	168	6,508	2,948	29,317
6/17	1,133	6,869	1,015	18,088	1,617	8,125	3,765	33,082
6/18	20,819	27,688	41,155	59,244	77,821	85,946	139,796	172,878
6/19	42,794	70,482	19,033	78,277	25,709	111,655	87,536	260,415
6/20	16,596	87,078	8,609	86,886	9,688	121,343	34,893	295,307
6/21	44,412	131,491	7,465	94,351	25,570	146,913	77,447	372,755
6/22	25,074	156,565	10,242	104,593	30,341	177,254	65,657	438,412
6/23	23,209	179,773	9,188	113,781	26,537	203,791	58,934	497,346
6/24	68,594	248,367	5,817	119,598	22,605	226,396	97,015	594,361
6/25	45,588	293,955	3,766	123,364	14,381	240,777	63,735	658,096
6/26	19,184	313,139	3,588	126,952	17,919	258,696	40,692	698,788
6/27	14,404	327,543	2,143	129,096	13,598	272,294	30,145	728,933
6/28	6,398	333,941	2,249	131,345	7,052	279,346	15,699	744,633
6/29	10,547	344,488	3,961	135,306	4,125	283,472	18,634	763,267
6/30	30,292	374,780	4,278	139,585	18,634	302,106	53,204	816,471
7/01	229,756	604,536	4,900	144,485	19,414	321,520	254,070	1,070,541
7/02	159,361	763,897	4,334	148,819	19,906	341,426	183,601	1,254,142
7/03	50,767	814,665	3,461	152,279	7,487	348,913	61,715	1,315,857
7/04	21,655	836,320	2,707	154,986	13,101	362,014	37,463	1,353,320
7/05	12,677	848,997	2,322	157,308	5,754	367,768	20,753	1,374,072
7/06	14,083	863,080	2,078	159,386	7,408	375,176	23,569	1,397,642
7/07	26,381	889,460	2,329	161,715	11,699	386,875	40,408	1,438,050

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Table 7.—Page 2 of 2.

Date	Sockeye		Chinook		Chum		Total	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/08	42,390	931,851	727	162,442	6,005	392,880	49,123	1,487,173
7/09	24,660	956,511	166	162,609	4,552	397,432	29,378	1,516,551
7/10	23,344	979,855	876	163,485	14,945	412,376	39,164	1,555,716
7/11	23,364	1,003,219	4,782	168,267	17,879	430,256	46,026	1,601,741
7/12	13,953	1,017,172	1,214	169,481	9,426	439,682	24,593	1,626,334
7/13	7,624	1,024,796	769	170,250	1,089	440,770	9,482	1,635,816
7/14	7,214	1,032,010	1,021	171,270	474	441,244	8,709	1,644,524
7/15	4,482	1,036,492	241	171,511	1,834	443,078	6,557	1,651,081
7/16	2,915	1,039,407	425	171,936	3,675	446,753	7,015	1,658,096
7/17	10,213	1,049,620	772	172,708	9,271	456,024	20,256	1,678,352
Total	1,049,620		172,708		456,024		1,678,352	

Table 8.—Total escapement estimates by strata and species, Nushagak River sonar project, 8 June through 17 July 2005.

Strata	Left Bank		Right Bank		Total
	Inshore	Offshore	Inshore	Offshore	
Escapement	637,543	121,530	901,123	18,156	1,678,352
Total Var	343,481,022	44,865,953	695,125,777	1,073,598	1,084,546,349
SE	18,533	6,698	26,365	1,036	32,932
CV	0.029	0.055	0.029	0.057	0.020
90% CI	30,395	10,985	43,239	1,699	54,009
Lower	587,696	103,514	830,211	15,369	1,589,776
Upper	687,390	139,545	972,035	20,943	1,766,927
Sockeye					
Escapement	459,255	14,787	571,951	3,627	1,049,620
Total Var	204,606,284	10,231,717	226,471,170	190,437	441,499,608
SE	14,304	3,199	15,049	436	21,012
CV	0.031	0.216	0.026	0.120	0.020
90% CI	23,459	5,246	24,680	716	34,460
Lower	420,782	6,184	531,475	2,454	993,106
Upper	497,727	23,390	612,427	4,801	1,106,134
Chinook					
Escapement	36,226	74,914	54,694	6,873	172,708
Total Var	25,691,822	19,685,990	162,912,653	410,596	208,701,060
SE	5,069	4,437	12,764	641	14,446
CV	0.140	0.059	0.233	0.093	0.084
90% CI	8,313	7,276	20,933	1,051	23,692
Lower	22,593	62,981	20,365	5,150	133,852
Upper	73,279	178,202	88,093	15,319	392,226
Chum					
Escapement	142,062	31,829	274,477	7,655	456,024
Total Var	113,182,916	14,948,246	305,741,955	472,565	434,345,682
SE	10,639	3,866	17,485	687	20,841
CV	0.075	0.121	0.064	0.090	0.046
90% CI	17,448	6,341	28,676	1,127	34,179
Lower	113,448	21,430	227,448	5,807	399,970
Upper	170,676	42,228	321,506	9,504	512,078

Table 9.—Sockeye salmon escapement estimates and average escapement percentage by date, Nushagak River, 1990–2005.

Date	Year														Average Percent ^a			
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily	Cum.
06/04				0													0.0	0.0
06/05		74		0													0.0	0.0
06/06	11	126		0													0.0	0.0
06/07	11	94		0													0.0	0.0
06/08	32	80		0		36										0	290	0
06/09	145	74	0	0	5	96	110	395	222	5						0	443	0
06/10	33	114	0	0	6	140	199	440	553	8	73					0	376	0
06/11	23	79	0	0	7	64	117	319	261	19	46					0	280	0
06/12	15	87	0	0	5	68	142	278	165	17	67	230	0	0	0	1,186	192	0.0
06/13	52	75	0	0	4	104	153	516	127	20	245	173	221	0	0	821	449	0.0
06/14	37	71	0	0	12	202	165	521	108	14	86	3,253	0	0	0	145	365	0.1
06/15	149	866	0	125	10	995	172	589	115	29	54	3,819	0	0	0	98	195	0.1
06/16	117	2,360	0	1,902	442	606	79	1,384	128	268	261	1,031	47	106	402	402	1,793	0.1
06/17	51	836	0	3,260	951	522	239	1,300	60	221	386	247	3	3,541	2,499	1,133	0.2	0.6
06/18	43	770	0	1,119	1,239	729	3,639	910	152	110	140	194	269	7,598	4,120	20,819	0.5	1.1
06/19	47	443	915	491	2,661	798	901	1,866	330	45	453	819	1,530	4,119	9,550	42,794	0.8	1.9
06/20	0	677	1,132	456	1,218	437	1,078	1,962	6,384	32	724	5,772	8,598	3,443	29,527	16,596	0.9	2.8
06/21	0	860	1,811	300	647	377	3,912	1,001	3,190	35	405	8,768	6,099	9,853	17,754	44,412	1.2	3.9
06/22	995	1,457	1,594	224	1,830	301	5,798	2,631	3,751	33	264	14,214	6,998	41,818	6,146	25,074	1.3	5.2
06/23	5,297	3,088	951	16,939	1,415	443	8,927	2,645	2,625	43	124	34,970	6,149	78,962	8,452	23,209	2.3	7.5
06/24	1,960	10,144	999	66,906	2,703	1,430	9,896	3,759	3,976	2,405	94	29,123	8,488	41,316	36,530	68,594	3.3	10.8
06/25	1,009	11,286	1,379	24,187	2,625	9,495	18,041	7,204	8,092	2,431	1,968	38,804	4,840	52,701	29,831	45,588	3.0	13.9
06/26	320	10,463	20,836	20,082	2,768	24,849	22,147	16,643	6,141	666	16,742	44,456	4,097	42,533	14,901	19,184	3.1	16.9
06/27	355	8,926	35,478	71,399	3,354	36,906	16,513	16,883	6,956	539	4,247	28,083	15,018	27,905	12,704	14,404	3.5	20.4
06/28	1,540	11,075	32,522	82,675	2,779	9,701	21,166	8,316	7,854	3,309	45,905	10,449	32,821	34,842	7,114	6,398	3.7	24.1
06/29	1,935	29,203	14,576	36,278	1,976	8,465	9,786	10,127	7,793	2,233	70,221	6,527	20,799	18,552	25,240	10,547	3.2	27.3
06/30	1,604	15,961	18,597	50,751	2,089	12,221	14,900	13,695	10,455	4,014	46,978	22,989	42,265	14,068	37,925	30,292	3.9	31.2

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Table 9.—Page 2 of 3.

Date	Year														Average Percent ^a			
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily	Cum.
07/01	9,858	62,496	12,759	37,845	3,143	16,971	19,093	25,312	6,262	9,217	30,858	50,353	14,095	19,014	45,691	229,756	6.9	38.1
07/02	85,624	30,292	5,701	21,457	12,185	8,510	21,304	24,776	10,675	42,891	13,997	39,027	16,136	18,946	18,282	159,361	6.1	44.2
07/03	55,341	88,577	3,239	76,757	41,736	10,376	40,175	13,902	37,050	44,770	13,110	85,925	4,484	49,433	9,060	50,767	7.2	51.5
07/04	23,207	100,822	19,927	66,723	51,759	7,911	27,231	17,175	52,668	33,122	15,431	127,463	6,760	42,629	12,969	21,655	7.3	58.8
07/05	8,977	35,766	22,121	44,078	23,759	3,097	29,537	6,006	116,872	35,790	6,656	60,521	5,315	14,427	25,240	12,677	5.2	64.0
07/06	34,852	4,094	63,871	25,266	22,208	6,548	19,431	14,090	72,184	29,267	4,479	32,314	7,548	6,225	23,859	14,083	4.4	68.4
07/07	314,041	2,228	71,122	14,559	22,030	12,049	24,920	14,301	20,985	24,132	2,530	30,063	9,636	3,706	37,439	26,381	7.3	75.7
07/08	56,812	1,641	36,090	12,452	18,918	48,281	17,535	12,874	25,902	9,572	2,535	11,410	10,991	6,045	21,749	42,390	3.9	79.6
07/09	10,124	1,306	12,242	6,289	30,097	24,353	14,260	14,221	12,095	6,973	3,630	15,791	22,223	3,974	5,448	24,660	2.4	82.0
07/10	4,864	1,809	9,580	4,837	128,121	5,606	11,098	12,039	4,647	5,081	5,121	17,238	14,826	2,357	4,788	23,344	3.0	85.0
07/11	2,752	3,342	89,913	2,764	22,288	8,590	9,794	6,161	7,003	5,816	2,581	8,273	9,110	6,919	3,247	23,364	2.5	87.4
07/12	7,528	4,810	173,110	2,678	11,051	3,930	11,307	20,575	3,664	4,873	5,086	6,604	5,593	3,375	1,273	13,953	3.2	90.7
07/13	6,579	2,073	17,703	2,725	8,748	1,780	14,442	26,312	1,317	2,011	41,229	4,814	4,584	6,364	3,575	7,624	1.8	92.4
07/14	3,799	2,984	8,591	3,239	6,121	1,231	10,546	15,542	1,114	2,914	27,279	6,326	4,029	3,522	8,385	7,214	1.3	93.7
07/15	3,165	2,185	4,679	2,161	2,858	1,088	7,112	9,620	834	5,174	4,694	7,171	3,955	3,501	4,643	4,482	0.8	94.5
07/16	2,129	3,716	3,525	2,436	3,451	1,453	7,542	4,630	898	3,622	4,880	8,297	3,631	2,505	2,923	2,915	0.7	95.2
07/17	1,953	6,206	2,895	3,824	14,088	1,230	3,874	9,264	435	2,784	3,903	5,340	4,255	1,078	3,074	10,213	0.9	96.1
07/18	1,319	7,250	1,559	1,891	11,342	656	14,891	6,472	275	3,367	3,771	7,388	464	1,214	1,124		0.7	96.8
07/19	845	7,552	1,417	1,803	5,247	632	18,421	4,085	309	2,449	2,562	7,647	658	1,499	729		0.6	97.4
07/20	883	3,914	1,433	908	4,015	607	7,282	2,419	577	2,437	2,157	4,081	1,016	891	1,218		0.4	97.8
07/21	1,206	2,408	2,016	776	3,419	443	3,877	2,515	758	2,770	2,294	3,126	1,383		998		0.3	98.1
07/22	2,785	3,854	825	554	2,741	753	7,491	2,303	1,143	3,193	1,812	6,315	1,097		1,183		0.4	98.6
07/23	3,579	2,516		501	3,081	522	7,905	4,245	412	2,540	1,986	979	845		1,430		0.4	98.9
07/24	3,278	575		455	2,797	869	7,182	3,084	260	2,033	2,332	784	714		1,188		0.3	99.2
07/25	483	16		363	6,579	1,579	534	1,861	289	1,574	1,421	165	1,183		0		0.2	99.4
07/26	572	15		44	6,159	1,201	485	1,895	616	1,933	238	179	334		0		0.2	99.6
07/27	600	16		35	6,420	197	861	1,157	429	1,183	291	144	0		0		0.1	99.7
07/28	788	62		23	2,058	360	348	1,340	855	864	1,202	83	0		879		0.1	99.8
07/29	1,204	224		27	2,440	56	454	1,126	829	343	1,027	34	0		809		0.1	99.9
07/30	1,220	102		28	186	70	1,024	4	536	260	827	51	1,842		0		0.1	100.0
07/31	763	33		21	286	53	259	6	631	270	183	201	331		78		0.0	100.0

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Table 9.—Page 3 of 3.

Date	Year													Average Percent ^a				
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily	Cum.
08/01	130	32		45	226	34	317	5	866	187	1,035	236	278		3,036			
08/02	138	61		35	112	62	868	4	911	34	1,071	63	123		1,391			
08/03	735	25		18	77	46	38	10	730	26	1,031	51	0		0			
08/04	188	21		33	71	30	695	8	2,009	212	769	35	0		0			
08/05	1,175	13		45	121	315	1,317	4	774	328	9	34	0		32			
08/06	2,993	26		23	83	253	720	5	1,052	170		26	0		91			
08/07	1,788	13		181	106	78	386	5	558	70		25	0		0			
08/08	5,030	7		82	99	29	197	6	8	42		29	0		856			
08/09	867	9		24	40	31	223	9	4	22		190	0		0			
08/10	0	14		0	180	43	232	25		30		104	0		0			
08/11	0	17		0	121	70	139	30		147		94	0		0			
08/12	0	22		0	0	33	83	20		99		104	0		0			
08/13	236	18		0	0	114	18	19		30		217	0		0			
08/14	177	24		0	0	54	16	20		21		135	0		0			
08/15	0	25		0	0	23	3	9		30		43	0		0			
08/16	0	8		0	0	25	7	4		22		28	0		0			
08/17	0	3		0	0	20	8	6		15		16	0					
08/18	0	5		0	0	36	17	4		23		17						
08/19	0	2		0	3	24	12	5		48		46						
08/20	0	3		0	2	0	9	7		222		16						
08/21	0	1		0	2	0	1	10		206								
08/22	0			0	3	0	5	33		74								
08/23	0			0	2	0	5	14		56								
08/24	0			0	1	0	2	7		49								
08/25	0			0	0	0	3	9		15								
08/26	0						15	5										
08/27	0						18	3										
08/28	0						2	5										
08/29								4										
08/30								6										
08/31								24										
09/01								14										
Total	680,368	492,522	695,108	715,099	509,326	281,307	503,651	373,035	458,874	311,899	403,500	803,537	315,681	580,534	491,730	1,049,620		

^a Average percent of total annual escapement 4 June through 31 July 1990–2005.

Table 10.—Chinook salmon escapement estimates and average escapement percentage by date, Nushagak River, 1990–2005.

Date	Year													Average Percent ^a					
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily	Cum.	
06/04				443													0.0	0.0	
06/05		106			585												0.0	0.1	
06/06	63	164		1,116													0.1	0.2	
06/07	64	118		3,486													0.3	0.5	
06/08	136	119		2,000		40								193			0.7	1.2	
06/09	386	121	124	846	374	172	962	111	368	8				7,957	1,773	1,119	1,336	1.1	2.3
06/10	151	159	105	700	351	161	1,242	160	1,053	14	309			4,774	2,304	1,266	1,712	1.0	3.3
06/11	108	139	110	854	375	125	690	62	543	48	171			993	1,205	1,066	981	0.5	3.9
06/12	94	164	140	767	413	125	765	57	355	30	197	561		643	531	3,024	1,379	0.7	4.5
06/13	241	138	1,567	484	248	193	1,242	74	296	43	872	559		267	446	4,863	1,381	0.9	5.4
06/14	166	120	1,138	442	126	409	995	137	238	33	292	7,303		262	366	2,494	1,263	1.1	6.6
06/15	2,468	1,214	715	215	86	3,896	663	2,034	261	72	273	9,319		273	1,811	881	3,323	2.0	8.5
06/16	1,953	4,751	1,177	3,490	6,597	2,029	390	5,023	234	720	1,107	2,905		626	1,529	957	987	2.5	11.0
06/17	844	2,332	2,841	4,805	13,555	1,329	2,129	2,140	122	496	2,791	568		637	2,377	2,543	1,015	2.9	13.9
06/18	712	2,008	3,607	2,170	2,687	1,143	8,621	1,735	257	227	938	399		221	4,291	3,516	41,155	5.3	19.2
06/19	788	1,201	852	1,284	4,565	1,444	4,947	1,893	628	131	1,895	1,230		4,668	2,773	20,395	19,033	4.8	24.0
06/20	542	923	967	1,014	2,807	1,291	2,751	2,367	11,914	103	2,855	1,830		15,187	2,994	10,629	8,609	4.8	28.8
06/21	1,374	1,166	1,765	568	1,475	1,190	2,807	520	5,968	75	1,419	3,305		2,773	2,049	3,004	7,465	2.6	31.5
06/22	10,709	1,888	1,388	433	7,989	636	2,831	709	7,159	74	928	4,247		1,919	2,749	2,127	10,242	4.0	35.5
06/23	4,692	4,199	895	10,830	5,402	976	1,331	565	6,620	214	546	6,584		4,762	2,244	5,192	9,188	4.6	40.1
06/24	1,729	19,352	959	8,307	3,233	1,701	1,399	490	5,835	8,063	428	4,736		3,681	3,671	11,428	5,817	5.8	45.9
06/25	890	10,207	1,047	3,964	3,377	12,525	3,282	1,633	5,902	3,384	7,699	4,522		3,247	4,866	2,208	3,766	5.2	51.1
06/26	285	7,721	8,043	3,282	4,082	16,726	1,776	3,545	3,672	1,383	5,441	4,943		1,304	6,053	1,304	3,588	5.2	56.3
06/27	313	3,502	4,726	5,403	1,861	6,242	1,010	1,604	4,163	1,065	1,098	3,738		1,385	4,328	2,536	2,143	3.2	59.5
06/28	264	4,555	4,428	6,410	1,315	3,175	1,411	770	1,426	896	2,412	1,772		492	3,170	724	2,249	2.5	62.1
06/29	332	10,129	5,354	2,879	1,045	2,630	225	615	1,610	425	2,291	1,113		1,982	2,794	1,734	3,961	2.8	64.9
06/30	283	5,290	7,036	3,499	957	3,195	297	1,091	1,631	507	2,451	3,242		1,835	1,758	3,653	4,278	2.9	67.8

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Table 10.–Page 2 of 3.

Date	Year													Average Percent ^a				
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily	Cum.
07/01	1,428	1,884	5,534	4,790	974	3,110	325	1,732	738	2,251	3,354	3,784	1,281	1,883	4,584	4,900	3.0	70.8
07/02	5,317	1,081	1,704	2,845	4,378	1,888	1,222	1,642	1,014	10,203	1,560	1,718	2,111	4,029	2,778	4,334	3.4	74.3
07/03	2,350	1,326	1,207	3,370	3,319	2,117	616	1,230	3,806	2,137	1,767	2,213	1,549	2,264	1,820	3,461	2.5	76.7
07/04	1,857	2,517	2,254	2,607	2,016	1,281	371	630	4,218	2,689	2,162	2,883	685	2,293	1,164	2,707	2.3	79.1
07/05	724	1,431	2,563	1,772	2,319	839	294	258	4,327	4,344	874	1,225	1,303	1,136	2,824	2,322	2.0	81.1
07/06	1,171	1,316	3,300	1,573	2,153	762	195	364	3,588	3,161	820	821	2,146	1,060	1,978	2,078	1.9	83.0
07/07	2,579	664	1,683	1,228	1,758	1,845	401	387	4,762	2,663	610	945	1,921	1,082	3,839	2,329	2.1	85.1
07/08	10,211	518	1,482	1,530	1,463	3,337	719	285	5,712	1,304	535	904	2,068	679	1,359	727	2.4	87.4
07/09	2,301	379	1,538	1,054	1,519	1,869	513	630	2,739	1,252	414	929	784	400	639	166	1.2	88.6
07/10	1,636	398	1,243	1,037	3,061	1,096	547	526	3,579	948	414	1,125	1,398	1,641	240	876	1.4	90.0
07/11	433	791	2,568	739	1,496	1,444	563	226	5,359	992	238	651	676	1,009	515	4,782	1.6	91.7
07/12	643	1,397	2,774	683	1,026	962	439	462	2,787	818	334	525	692	1,270	557	1,214	1.2	92.8
07/13	619	390	1,823	555	932	516	477	921	1,624	675	951	367	569	254	312	769	0.8	93.7
07/14	447	468	1,074	627	764	261	325	1,099	1,292	713	1,252	446	940	220	506	1,021	0.8	94.5
07/15	179	386	725	392	411	223	415	629	844	903	391	1,005	688	377	602	241	0.6	95.1
07/16	157	543	698	455	461	332	333	260	555	818	408	1,309	467	1,375	162	425	0.6	95.7
07/17	281	838	512	533	1,016	255	141	606	427	719	291	990	444	479	159	772	0.6	96.3
07/18	243	953	431	321	693	154	254	413	256	1,051	297	1,048	785	457	160		0.5	96.9
07/19	25	1,117	317	311	295	162	510	197	275	767	308	1,015	462	534	243		0.5	97.3
07/20	30	637	211	208	365	135	306	126	429	853	203	592	391	279	183		0.4	97.7
07/21	51	531	177	141	303	122	262	124	731	956	181	421	426		592		0.4	98.1
07/22	114	1,245	46	73	401	228	83	98	1,115	823	181	743	363		412		0.4	98.5
07/23	127	580		106	370	134	83	148	357	606	111	462	220		179		0.2	98.7
07/24	131	177		99	242	225	34	135	200	591	87	342	349		284		0.2	98.9
07/25	364	19		94	403	196	35	56	147	395	68	162	154		57		0.2	99.1
07/26	208	20		27	351	155	40	67	310	561	33	162	355		0		0.2	99.3
07/27	94	18		21	317	23	116	31	242	236	55	134	62		174		0.1	99.4
07/28	531	62		19	74	24	122	46	342	237	198	85	578		26		0.2	99.5
07/29	37	244		16	47	31	133	42	386	127	466	60	300		659		0.2	99.7
07/30	22	207		20	29	33	173	0	254	76	72	57	59		1,809		0.2	99.9
07/31	12	47		9	16	28	70	0	275	57	136	215	274		0		0.1	100.0

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Table 10.—Page 3 of 3.

Date	Year													Average Percent ^a			
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily
08/01	0	34		11	18	15	31	0	368	62	339	199	34		0		
08/02	46	64		16	25	36	42	0	388	16	370	56	124		8		
08/03	0	31		17	9	20	36	0	1,365	25	323	57	324		8		
08/04	0	23		25	10	10	16	0	1,289	80	156	36	290		5		
08/05	0	18		33	0	96	28	0	297	84	0	42	504		6		
08/06	0	28		13	0	103	21	0	386	23		39	0		0		
08/07	0	12		101	0	43	18	0	276	8		30	13		198		
08/08	0	8		48	0	12	10	0	91	5		45	122		0		
08/09	0	11		17	0	14	16	0	48	4		260	103		14		
08/10	0	27		0	0	17	19	0	2	7		117	60		23		
08/11	0	28		0	0	25	3	0	1	15		94	0		0		
08/12	0	28		0	0	9	2	0	2	7		435	0		0		
08/13	0	14		0	0	29	1	0	2	8		293	0		0		
08/14	0	9		0	0	15	1	0	1	6		133	0		0		
08/15	0	8		0	0	6	0	0	1	3		52	0		0		
08/16	0	16		0	0	7	0	0	4	6		31	0		0		
08/17	0	7		0	0	7	0	0	17	4		30	0				
08/18	0	7		0	0	11	0	0	8	5		29					
08/19	0	3		0	0	7	0	0	2	4		42					
08/20	0	4		0	0	0	0	0	0	1		41					
08/21	0	1		0	0	0	0	0	0	1		3					
08/22	0			0	0	0	0	0	0	0		4					
08/23	0			0	0	0	0	0	0	0		6					
08/24	0			0	0	0	0	0	0	0		4					
08/25	0			0	0	0	0	0	0	0		1					
Total	63,955	104,351	82,848	97,812	95,954	85,622	52,127	40,705	117,495	62,331	56,372	92,275	87,141	80,028	116,400	172,708	

^a Average percent of total annual escapement 4 June through 31 July 1990–2005.

Table 11.—Chum salmon escapement estimates and average escapement percentage by date, Nushagak River, 1990–2005.

Date	Year													Average Percent ^a				
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Daily	Cum.
06/04				187													0.0	0.0
06/05		110		195													0.0	0.0
06/06	35	183		664													0.0	0.0
06/07	36	144		937													0.0	0.1
06/08	88	124		627	88											3,953	257	0
06/09	322	119	253	477	362	258	1,547	68	139	29						23,653	427	0
06/10	94	170	275	304	255	324	2,312	74	345	61	529					29,067	375	0
06/11	66	124	178	393	367	175	1,333	45	197	177	410					9,472	338	0
06/12	51	135	245	281	442	186	1,589	39	130	139	552	1,065	4,133	49	1,099	461	0.2	2.0
06/13	149	117	2,377	170	318	293	1,992	74	112	136	1,743	928	3,500	19	2,109	57	0.3	2.3
06/14	104	112	1,719	176	183	595	1,958	88	84	91	665	14,597	2,297	199	450	729	0.5	2.9
06/15	2,191	1,211	993	170	213	3,125	2,023	412	88	217	369	17,824	2,199	34	1,011	3,465	0.8	3.6
06/16	1,691	3,354	2,308	1,878	5,901	1,884	968	1,034	107	1,876	2,236	5,249	941	19	1,630	168	0.7	4.3
06/17	747	1,169	6,097	2,786	20,237	1,472	3,508	587	46	1,642	4,290	1,137	757	3,151	10,674	1,617	1.3	5.6
06/18	618	1,024	7,379	1,213	6,514	1,757	21,909	426	134	838	1,117	872	1,749	5,600	5,334	77,821	2.9	8.5
06/19	665	627	2,014	659	15,354	1,967	12,684	609	388	314	3,804	3,290	25,505	5,190	24,978	25,709	2.7	11.1
06/20	1,627	941	2,552	605	7,312	1,275	10,515	713	8,457	200	6,188	8,841	39,254	4,222	46,225	9,688	3.2	14.3
06/21	4,766	1,190	4,256	422	4,009	1,111	11,063	222	3,504	243	3,382	14,457	6,047	11,584	16,835	25,570	2.3	16.6
06/22	61,168	2,159	3,587	336	27,174	818	14,955	597	12,299	221	2,326	20,765	4,945	22,038	14,700	30,341	4.7	21.3
06/23	13,549	4,678	2,177	8,003	18,933	1,168	7,758	501	12,064	279	1,054	36,113	23,275	9,438	15,504	26,537	3.9	25.2
06/24	5,180	37,121	2,302	21,400	16,333	3,151	8,448	508	9,284	14,887	889	28,633	27,489	10,139	16,626	22,605	4.8	30.0
06/25	2,668	13,765	2,926	7,538	15,897	22,478	22,596	1,401	15,723	7,766	15,690	29,192	7,190	26,322	6,699	14,381	4.6	34.6
06/26	787	12,980	70,205	5,265	17,462	50,089	7,325	3,059	12,443	2,396	14,334	32,744	5,278	2,345	4,997	17,919	5.6	40.2
06/27	942	10,142	30,632	23,140	9,175	18,394	13,954	2,381	14,011	2,154	3,637	12,037	31,537	11,819	12,510	13,598	4.5	44.7
06/28	152	12,072	16,697	23,874	7,725	7,509	15,147	1,335	5,526	7,766	11,077	4,762	16,033	14,918	6,655	7,052	3.4	48.1
06/29	190	20,662	12,895	5,421	5,530	6,426	2,515	1,254	5,588	3,275	17,056	2,991	10,109	7,894	2,109	4,125	2.3	50.4
06/30	137	11,025	15,892	9,468	5,566	8,561	4,155	4,876	7,341	5,508	18,172	10,062	11,425	8,495	14,556	18,634	3.3	53.7

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Table 11.–Page 2 of 3.

Date	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average Percent ^a	
																Daily	Cum.	
07/01	37,878	5,882	11,160	10,034	7,442	10,535	7,901	10,755	3,962	29,784	4,925	15,712	20,870	11,916	12,777	19,414	4.7	58.4
07/02	28,403	4,831	9,766	7,751	46,488	6,408	8,992	8,532	6,624	58,420	2,261	7,876	6,360	20,842	4,025	19,906	5.3	63.8
07/03	23,937	20,793	5,105	16,516	16,785	7,832	9,843	3,064	27,448	10,626	2,180	19,047	10,603	13,141	599	7,487	4.2	67.9
07/04	6,148	57,022	3,530	19,039	11,018	4,351	5,053	1,249	21,653	16,369	2,445	28,512	4,164	7,008	3,344	13,101	4.4	72.3
07/05	2,364	17,481	3,769	6,358	16,547	1,910	1,256	413	24,007	25,340	948	26,953	6,631	9,967	2,954	5,754	3.3	75.6
07/06	19,729	1,546	6,620	4,392	8,063	3,392	1,759	1,084	21,323	11,083	693	14,630	3,718	6,898	8,132	7,408	2.6	78.2
07/07	19,224	936	13,819	2,819	7,176	7,703	1,674	642	18,917	8,004	430	14,176	5,104	18,579	5,374	11,699	2.9	81.1
07/08	28,154	739	5,901	2,712	5,729	18,750	2,366	201	23,583	3,437	415	12,882	3,715	12,354	4,080	6,005	2.8	83.9
07/09	6,448	559	3,023	4,578	14,793	5,325	1,909	1,336	11,201	2,541	524	18,939	2,048	4,379	2,901	4,552	1.8	85.8
07/10	10,333	780	2,362	3,690	22,801	2,097	1,430	665	5,645	2,244	677	19,411	5,257	6,592	547	14,945	2.1	87.9
07/11	3,337	1,366	19,174	2,098	6,060	2,989	855	308	8,801	2,437	314	9,898	2,752	5,067	253	17,879	1.8	89.7
07/12	2,854	1,706	14,505	1,612	3,270	1,639	898	1,207	4,537	2,084	627	7,687	3,561	4,982	317	9,426	1.3	91.0
07/13	2,472	1,580	6,202	1,600	2,667	819	1,068	3,580	1,588	969	3,505	5,841	5,112	4,570	512	1,089	0.9	91.9
07/14	1,035	2,223	3,027	2,696	2,369	507	803	2,042	1,165	1,247	3,875	8,119	9,838	3,045	2,385	474	1.0	92.9
07/15	564	1,646	1,603	1,995	1,117	449	654	1,204	647	1,892	687	9,892	4,468	3,309	2,195	1,834	0.7	93.6
07/16	436	2,752	1,351	2,263	1,340	638	669	611	597	1,483	705	11,582	3,365	3,142	625	3,675	0.8	94.4
07/17	612	4,559	1,225	3,409	5,197	523	242	1,321	343	1,157	626	8,079	5,868	3,834	2,757	9,271	1.1	95.4
07/18	496	5,325	614	1,719	2,675	283	817	748	209	1,609	616	10,033	4,859	2,870	1,956	0.7	96.2	
07/19	651	5,615	550	1,644	900	282	1,072	376	228	1,181	449	9,551	1,566	4,392	754	0.6	96.8	
07/20	702	2,938	548	878	750	253	490	228	415	1,270	359	5,057	1,203	3,628	507	0.4	97.2	
07/21	1,011	1,876	755	720	606	204	286	230	590	1,483	374	3,850	4,260		153	0.4	97.6	
07/22	2,313	3,217	290	494	679	365	334	179	870	1,270	283	7,193	2,986		153	0.4	98.0	
07/23	2,872	1,973		475	769	245	352	330	302	1,039	301	4,995	1,566		104	0.3	98.3	
07/24	2,703	471		433	688	384	325	291	171	1,010	343	3,779	1,203		2,824	0.3	98.6	
07/25	2,641	67		359	1,652	428	240	140	169	730	221	1,181	4,260		3,547	0.3	99.0	
07/26	2,495	68		13	1,759	337	227	156	343	1,011	79	1,242	2,986		2,253	0.3	99.3	
07/27	2,265	73		15	1,828	35	440	76	245	579	95	1,008	1,937		262	0.2	99.4	
07/28	4,130	256		13	642	68	263	95	436	454	403	597	636		1,902	0.2	99.7	
07/29	601	978		8	114	27	350	90	418	200	359	245	1,098		1,904	0.1	99.8	
07/30	525	376		9	173	35	633		272	145	269	349	969		0	0.1	99.9	
07/31	318	153		10	196	26	199		313	154	177	1,440	2,546		78	0.1	100.0	

-continued-

Table 11.–Page 3 of 3.

Date	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average Percent ^a	Daily	Cum.
08/01	447	161		29	218	10	35		377	110	336	1,608	1,870				740		
08/02	46	334		10	102	23	398		438	26	353	442	1,133				3,264		
08/03	269	149		11	44	11	170		1,099	24	328	347	1,523				78		
08/04	557	123		12	40	16	126		1,398	114	433	246	15				84		
08/05	828	79		15	38	197	285		257	152	89	249	78				1,624		
08/06	3,290	159		10	40	133	126		343	59	16	199	43				8		
08/07	1,863	92		126	123	36	67		212	23	12	201					2,970		
08/08	5,102	48		60	53	8	40		39	15	9	244					14		
08/09	896	61		16	2	8	47		20	10	6	1,494					150		
08/10	0	70			13	27	50			13	8	858					0		
08/11	0	82			473	46	19			46	6	738					0		
08/12	0	122			33	26	10			28	7	1,209					0		
08/13	297	114			16	62	1			16	12	2,032					0		
08/14	199	166			17	23	1			10	8	1,139					0		
08/15	47	177			14	11				9	5	399					0		
08/16	16	32			10	9				8	5	253					0		
08/17	97	13			11	8				6	6	186							
08/18	97	25			8	6				9		182							
08/19	68	12			21	9				16		388							
08/20		13			17					51		266							
08/21		4			26					47									
08/22					25					19									
08/23					16					17									
08/24					12					13									
08/25					1					4									
Total	329,793	287,281	302,858	217,230	378,928	212,612	225,029	61,456	299,215	242,312	141,324	547,995	429,978	295,413	283,811	456,024			

^a Average percent of total annual escapement 4 June through 31 July 1990–2005.

Table 12.—Age composition of sockeye salmon escapement, Nushagak River, 2005.

Sampling Period	Date		Age Group								Total
	Start	End	0.2	0.3	1.2	0.4	1.3	2.2	1.4	0.5	
Period 1:	08 Jun	24 Jun									
Percent (%)			0.5	2.9	13.1	0.5	79.5		2.1	1.3	100
SE (%)			0.4	0.9	1.7	0.4	2.1		0.7	0.6	2.0
Number of Fish			1,325	7,285	32,453	1,325	197,369		5,298	3,312	248,367
SE (Number)			935	2,167	4,328	935	5,188		1,856	1,473	16,882
Sample Size			2	11	49	2	298		8	5	375
Period 2:	25 Jun	02 Jul									
Percent (%)			0.6	5.2	10.7	0.4	80.8	0.2	1.7	0.2	100
SE (%)			0.3	1.0	1.3	0.3	1.7	0.0	0.6	0.0	1.6
Number of Fish			2,859	26,682	55,269	1,906	416,427	953	8,576	953	1,906
SE (Number)			1,647	4,915	6,864	1,346	8,742	0	2,838	0	1,346
Sample Size			3	28	58	2	437	1	9	1	541
Period 3:	03 Jul	17 Jul									
Percent (%)			9.3	10.6	0.3	74.6	0.3	4.5		0.3	100
SE (%)			1.7	1.7	0	2.5	0	1.2		0	2.3
Number of Fish			26,643	30,318	919	213,143	919	12,862		919	285,723
SE (Number)			4,719	4,998	0	7,064	0	3,365		0	6,516
Sample Size			29	33	1	232	1	14		1	311
Total											
Percent (%)			0.4	5.8	11.2	0.4	78.8	0.2	2.5	0.1	100
SE (%)			0.3	1.3	1.6	0.3	2.0	0.0	0.9	0.0	1.9
Number of Fish			4,183	60,610	118,041	4,149	826,939	1,872	26,737	953	6,136
SE (Number)			1460	4,581	5,799	1,055	7,601	0	2,951	0	1,317
Sample Size			5	68	140	5	967	2	31	1	8
											1,227

Table 13.—Sex composition by age and mean length (mm) by age, and sex of sockeye salmon escapement, Nushagak River, 2005.

Sampling Period	Date		Age Group										
	Start	End	0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	Total	
Period 1:	8 Jun	24 Jun											
Males: Percent (%)			50.0	45.5	63.3		51.3		25.0	60.0	52.0		
SE (%)				15.7	7.0		2.9		16.4	24.5	6.7		
Number of Males			662	3,309	20,516		101,255		1,324	1,985	129,050		
SE (Males)				1,472	3,534		6,307		935	1,143	5,769		
Sample Size			1	5	31		153		2	3	195		
Mean Length			435	518	460		569		600	589	550		
SE (Length)				9.6	10.6		3.3		30.0	21.7	3.1		
Sample Size			1	5	31		153		2	3	195		
Females: Percent (%)			50.0	54.5	36.7	100.0	48.7		75.0	40.0	48.0		
SE (%)				15.7	7.0		2.9		16.4	24.5	7.0		
Number of Females			662	3,971	11,912	1,324	95,960		3,971	1,324	119,123		
SE (Females)				1,610	2,743	935	6,249		1,610	935	5,693		
Sample Size			1	6	18	2	145		6	2	180		
Mean Length			520	550	495	578	548		573	549	544		
SE (Length)				12.6	8.8	2.5	1.9		9.2	9.0	1.9		
Sample Size			1	6	18	2	145		6	2	180		
Both Sexes: Number of Fish			1,324	7,280	32,428	1,324	197,215		5,294	3,309	248,173		
SE (Number)				935	2,165	4,325	935	5,184		1,854	1,472	4,904	
Sample Size			2	11	49	2	298		8	5	375		
Mean Length			478	535	473	578	559		579	573	547		
SE (Length)				8.1	7.5	2.5	1.9		10.2	13.5	1.9		
Sample Size			2	11	49	2	298		8	5	375		
Period 2:	25 Jun	2 Jul											
Males: Percent (%)			100.0	60.7	63.8	100.0	53.0		44.4	50.0	54.6		
SE (%)				9.4	6.4		2.4		17.6		5.2		
Number of Males			2,859	16,200	35,258	1,906	220,125		3,812	953	281,112		
SE (Males)			1,647	3,870	5,600	1,346	10,974		1,901		9,959		
Sample Size			3	17	37	2	231		4	1	295		
Mean Length			450	578	461	590	581		579	610	564		
SE (Length)			7.6	7.5	8.5		2.0		26.8		2.0		
Sample Size			3	17	37	2	231		4	1	295		
Females: Percent (%)				39.3	36.2		47.0	100.0	100.0	55.6	50.0	45.4	
SE (%)				9.4	6.4		2.4		17.6		5.4		
Number of Females			10,482	20,011		195,349	953	953	4,765	953	233,466		
SE (Females)			3,131	4,285		10,762			2,123		9,952		
Sample Size			11	21		205	1	1	5	1	245		
Mean Length			551	512		550	520	595	578	580	548		
SE (Length)			5.7	6.0		1.4			13.6		1.3		
Sample Size			11	21		205	1	1	5	1	245		
Both Sexes: Number of Fish			2,859	26,682	55,269	1,906	416,427	953	953	8,576	1,906	515,531	
SE (Number)			1,647	4,915	6,864	1,346	8,742	953	953	2,838	1,346	8,258	
Sample Size			3	28	58	2	437	1	1	9	2	541	
Mean Length			450	568	480	590	566	520	595	578	595	557	
SE (Length)			7.6	5.1	5.9		1.3			14.1		1.2	
Sample Size			3	28	58	2	436	1	1	9	2	540	

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Table 13.–Page 2 of 2.

Sampling Period	Date		Age Group										
	Start	End	0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	Total	
Period 3:	3 Jul	17 Jul											
Males: Percent (%)			58.6		42.4	100.0	64.9			50.0		61.0	
SE (%)			9.3		8.7		3.1			13.9		5.3	
Number of Males			15,618		12,862	919	137,808			6,431		173,638	
SE (Males)			3,689		3,365		8,109			2,407		7,380	
Sample Size			17		14	1	150			7		189	
Mean Length			597		483	630	592			628		586	
SE (Length)			5.0		20.4		2.0			4.4		2.2	
Sample Size			17		14	1	150			7		189	
Females: Percent (%)			41.4		57.6		35.1	100.0		50.0	100.0	39.0	
SE (%)			9.3		8.7		3.1			13.9		6.2	
Number of Females			11,025		17,456		74,416	919		6,431	919	111,165	
SE (Females)			3,126		3,887		7,122			2,407		6,136	
Sample Size			12		19		81	1		7	1	121	
Mean Length			560		501		554	510		574	580	548	
SE (Length)			4.1		7.1		2.2			8.8		2.0	
Sample Size			12		19		81	1		7	1	121	
Both Sexes: Number of Fish			26,643		30,318	919	213,143	919		12,862	919	285,722	
SE (Number)			4,719		4,998	919	7,064	919		3,365	919	6,517	
Sample Size			29		33	1	232	1		14	1	311	
Mean Length			582		493	630	579	510		601	580	571	
SE (Length)			3.4		9.5		1.5			4.9		1.6	
Sample Size			29		33	1	231	1		14	1	310	
Total													
Males: Percent (%)			84.2		58.0	58.2	68.1	55.7		43.3	47.9	55.7	
SE (%)			21.7		10.1	7.0	2.8			15.5	34.9	5.6	
Number of Males			3,521		35,127	68,636	2,825	459,188		11,566	2,938	583,800	
SE (Males)			1,512		3,628	4,686	1,224	9,286		2,124	1,085	8,445	
Sample Size			4		39	82	3	534		13	4	679	
Mean Length			447		581	465	603	581		609	596	568	
SE (Length)			6.0		4.2	6.6		1.4		9.7	15.4	1.4	
Sample Size			4		39	82	3	534		13	4	679	
Females: Percent (%)			15.8		42.0	41.8	31.9	44.3	100.0	100.0	56.7	52.1	44.3
SE (%)					10.6	7.4		2.7			15.8	31.5	6.0
Number of Females			662		25,478	49,379	1,324	365,726	1,872	953	15,166	3,195	463,754
SE (Females)					2,944	3,821	935	9,079	936		2,133	936	8,198
Sample Size			1		29	58	2	431	2	1	18	4	546
Mean Length			520		555	504	578	551	515	595	575	567	547
SE (Length)					3.6	4.1	2.5	1.0			6.0	4.1	1.0
Sample Size			1		29	58	2	431	2	1	18	4	546
Both Sexes: Number of Fish			4,182		60,604	118,015	4,148	826,785	1,872	953	26,733	6,134	1,049,426
SE (Number)			1,460		4,581	5,798	1,140	7,600	936	953	2,951	1,363	7,124
Sample Size			5		68	140	5	967	2	1	31	8	1,227
Mean Length			459		570	481	595	568	515	595	590	581	558
SE (Length)			4.9		2.8	4.2	0.9	0.9			5.4	7.8	0.9
Sample Size			5		68	140	5	965	2	1	31	8	1,225

Table 14.—Age composition of Chinook salmon escapement, Nushagak River, 2005.

Sampling Period	Date		Age Group				Total
	Start	End	1.2	1.3	1.4	1.5	
Period 1:	08 Jun	17 Jul					
Percent (%)			14.2	47.0	37.9	1.0	100.0
SE (%)			1.4	2.0	2.0	0.4	
Number of Fish			24,469	81,090	65,441	1,707	172,708
SE (Number)			2,447	3,501	3,403	694	5,506
Sample Size			86	285	230	6	607

Table 15.—Sex composition by age and mean length (mm) by age, and sex of Chinook salmon escapement, Nushagak River, 2005.

Sampling Period	Date		Age Group				Total
	Start	End	1.2	1.3	1.4	1.5	
Period 1:	08 Jun	17 Jul					
Percent (Males)			94.1	63.3	41.2	50.0	59.1
Number of Males			23,030	51,290	26,929	854	102,103
Standard Error (Males)			2,359	3,188	2,505	492	2,832
Sample Size (Males)			80	179	93	3	355
Mean Length (Males)			558	720	808	928	709
Standard Error (Length-Males)			7.2	6.4	12.6	51.3	4.9
Sample Size (Length-Males)			80	179	93	3	355
Percent (Females)			5.9	36.7	58.8	50.0	40.9
Number of Females			1,439	29,800	38,512	854	70,605
Standard Error (Females)			630	2,634	2,877	492	2,730
Sample Size (Females)			5	104	133	3	245
Mean Length (Females)			573	775	824	868	799
Standard Error (Length-Females)			23	6	5	46	4
Sample Size (Length-Females)			5	104	132	3	244
Number (Not Identified)							
Sample Size (Not Identified)			1	2	4		7
Number of Fish			24,469	81,090	65,441	1,707	172,708
Standard Error (Number)			2,294	2,996	2,730	492	2,791
Sample Size (Number)			86	285	230	6	607
Mean Length (Both)			559	741	817	898	745
Standard Error (Length-Both)			2.6	1.6	1.9	13.4	1.1
Sample Size (Length-Both)			85	283	226	6	600

Table 16.—Age composition of chum salmon escapement, Nushagak River, 2005.

Sampling Period	Date		Age Group				
	Start	End	0.2	0.3	0.4	0.5	Total
Period 1:	08 Jun	17 Jul					
Males:	Percent (%)		0.2	85.5	14.2	0.2	100.0
	SE (%)			1.5	1.4		1.5
	Number of Fish		780	389,765	64,701	780	456,025
	SE (Number)			6,650	6,584		6,629
	Sample Size		1	500	83	1	585

Table 17.—Sex composition by age and mean length (mm) by age and sex of chum salmon escapement, Nushagak River, 2005.

Sampling Period	Date		Age Group				
	Start	End	0.2	0.3	0.4	0.5	Total
Period 1:	8 Jun	17 Jul					
Males:	Percent (%)		62.1	74.7	100.0		63.9
	SE (%)		2.2	4.8			2.8
	Number of Males		241,835	48,367	780		290,982
	SE (Males)		9,425	5,813			8,914
	Sample Size		310	62	1		373
	Mean Length		610	611	675		611
	SE (Length)		2.1	5.2			1.9
	Sample Size		310	62	1		373
Females:	Percent (%)	100.0	37.9	25.3			36.1
	SE (%)		2.2	4.8			2.6
	Number of Females	780	147,441	16,382			164,604
	SE (Females)		8,831	3,513			8,432
	Sample Size	1	189	21			211
	Mean Length	510	566	569			566
	SE (Length)		2.1	5.0			1.9
	Sample Size	1	189	21			211
Both Sexes:	Number of Fish	780	390,056	64,749	780		456,366
	SE (Number)	780	6,655	6,589	780		6,634
	Sample Size	1	500	83	1		585
	Mean Length	510	593	600	675		594
	SE (Length)		1.5	4.1			1.4
	Sample Size	1	499	83	1		584

Table 18.—Genetic samples collected by date, species, and bank, Nushagak River sonar project, 2005.

Date	Species	Location	Samples
6/20–7/16	sockeye salmon	Nushagak Sonar- Left Bank	186
6/20–7/16	sockeye salmon	Nushagak Sonar - Right Bank	227
Total			413

Table 19.—Average air and water temperature, Nushagak River sonar project, June, July and August, 2005.

Year	Average Air Temperature (°C)			Average Water Temperature (°C)		
	June	July	August	June	July	August
1986	11.4	12.7	11.0	14.3	12.5	10.0
1987	10.5	14.2	13.1	9.5	12.1	13.1
1988	12.5	14.7	12.6	11.1	14.8	13.7
1989	11.5	14.0	14.8	10.4	14.9	15.6
1990	12.1	13.7	12.3	11.7	14.8	14.1
1991	12.1	14.1	13.1	11.6	14.7	14.3
1992	12.3	12.8	^a	10.7	11.7	^a
1993	11.7	14.0	11.9	12.5	15.4	14.3
1994	11.3	11.8	11.7	12.8	12.8	14.6
1995	12.3	13.3	11.0	10.5	14.5	13.0
1996	11.2	12.8	11.5	12.0	14.3	13.2
1997	13.6	15.0	12.5	14.3	16.6	14.6
1998	10.7	12.9	11.4	9.1	13.2	13.2
1999	11.6	14.1	11.3	11.1	13.6	13.1
2000	11.9	12.7	13.0	11.2	13.7	13.3
2001	11.0	10.8	12.1	11.2	13.7	13.3
2002	13.0	13.3	14.6	11.7	14.2	15.8
2003	11.4	13.5	^a	13.0	14.2	^a
2004	13.3	15.5	16.7	12.7	15.9	16.3
2005	15.9	15.5	^a	13.1	15.9	^a
1986-04 Min	10.5	10.8	11.0	9.1	11.7	10.0
1986-04 Max	13.6	15.5	16.7	14.3	16.6	16.3
1986-04 Average	11.9	13.5	12.6	11.7	14.1	13.8

^a Project not operated in August.

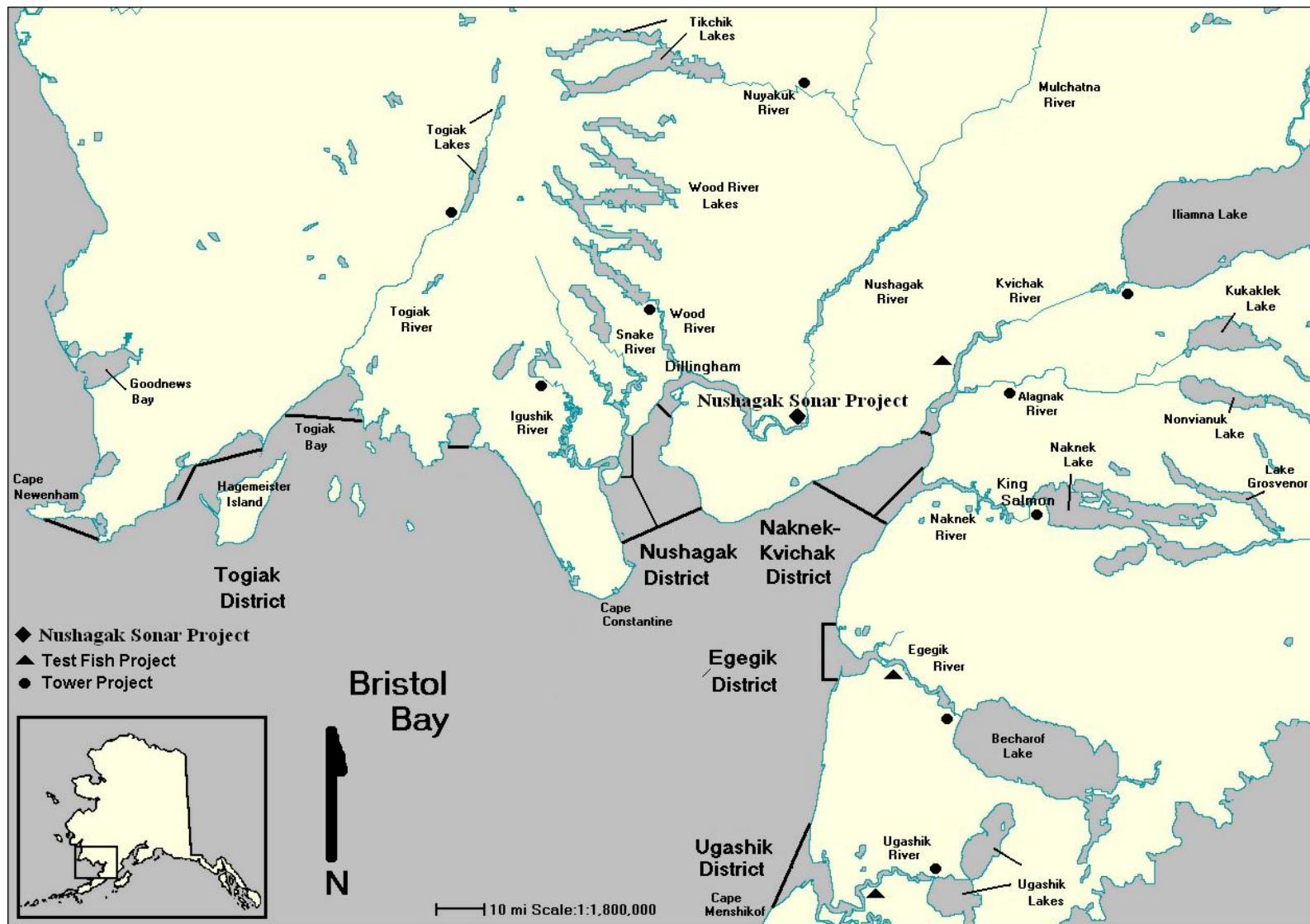


Figure 1.—Nushagak River Sonar Site, Bristol Bay.

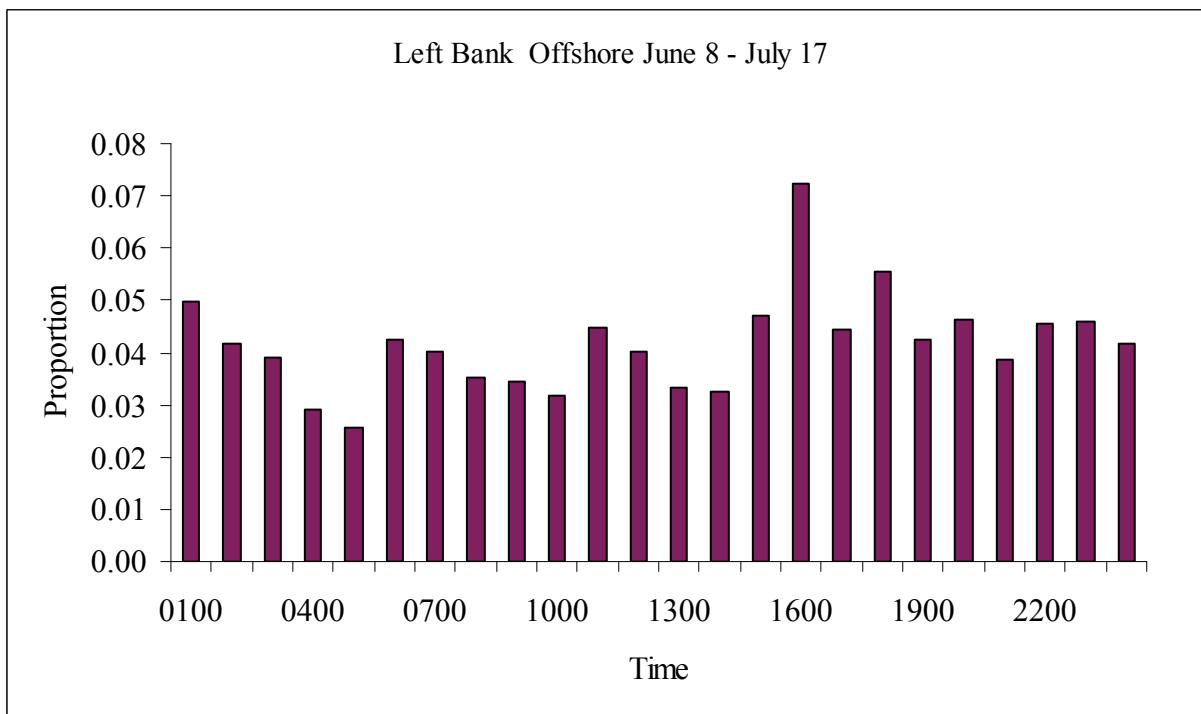
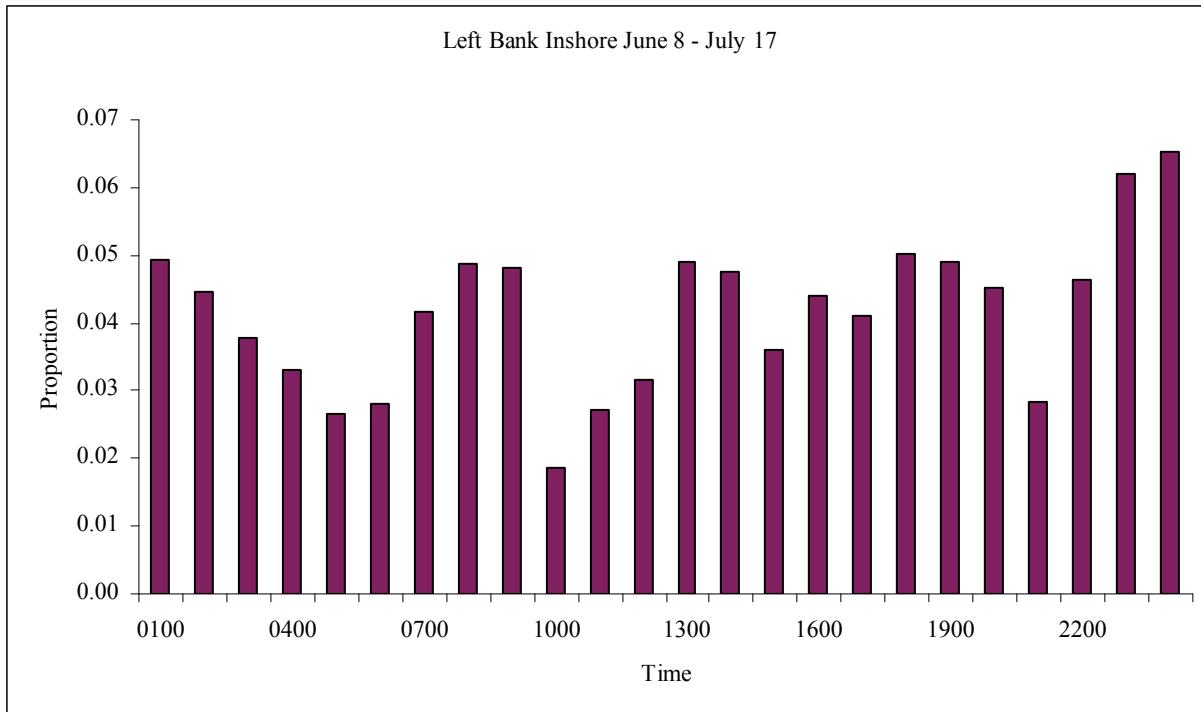


Figure 2.—Average proportion of total sonar salmon counts by hour for the left bank inshore (top) and offshore (bottom), Nushagak River sonar project, 8 June to 17 July, 2005.

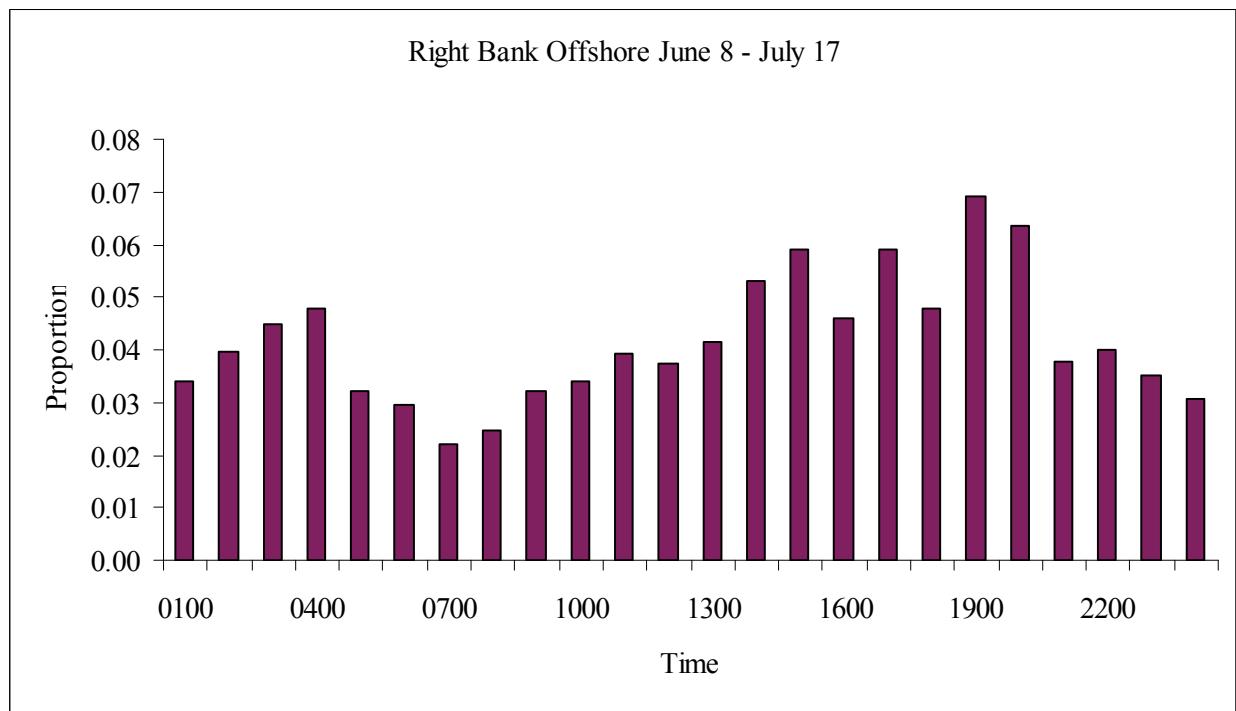
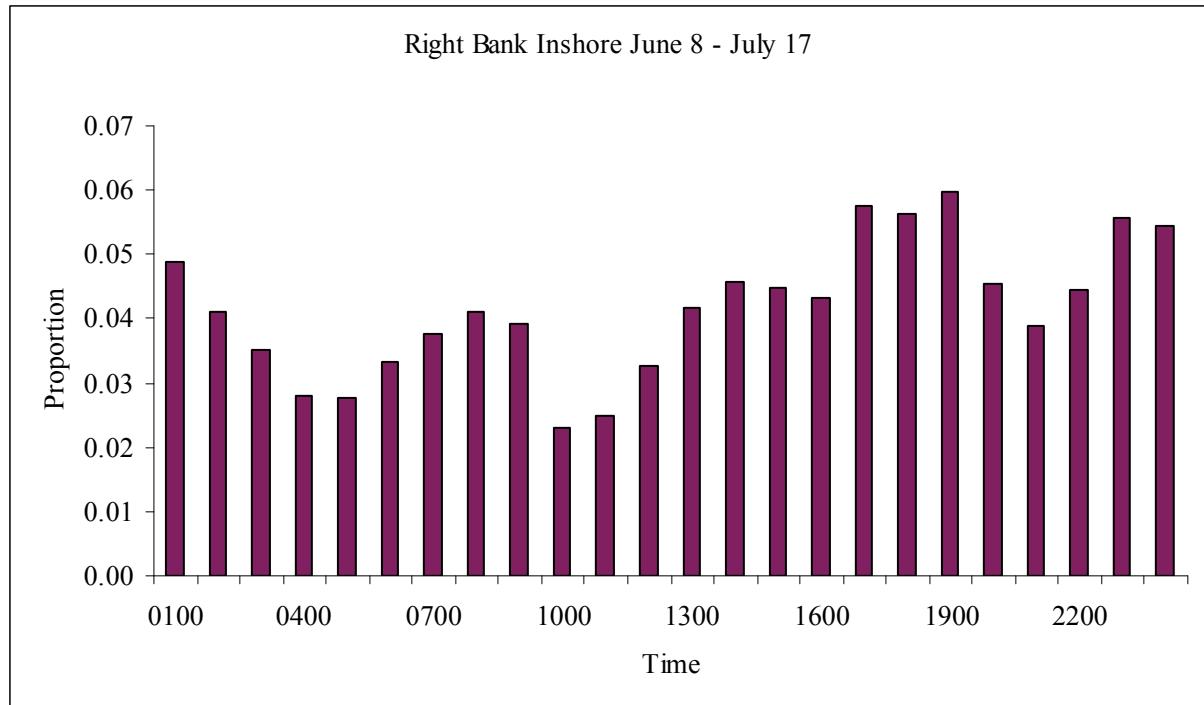


Figure 3.—Average proportion of total sonar salmon counts by hour for the right bank inshore (top) and offshore (bottom), Nushagak River sonar project, 8 June to 17 July, 2005.

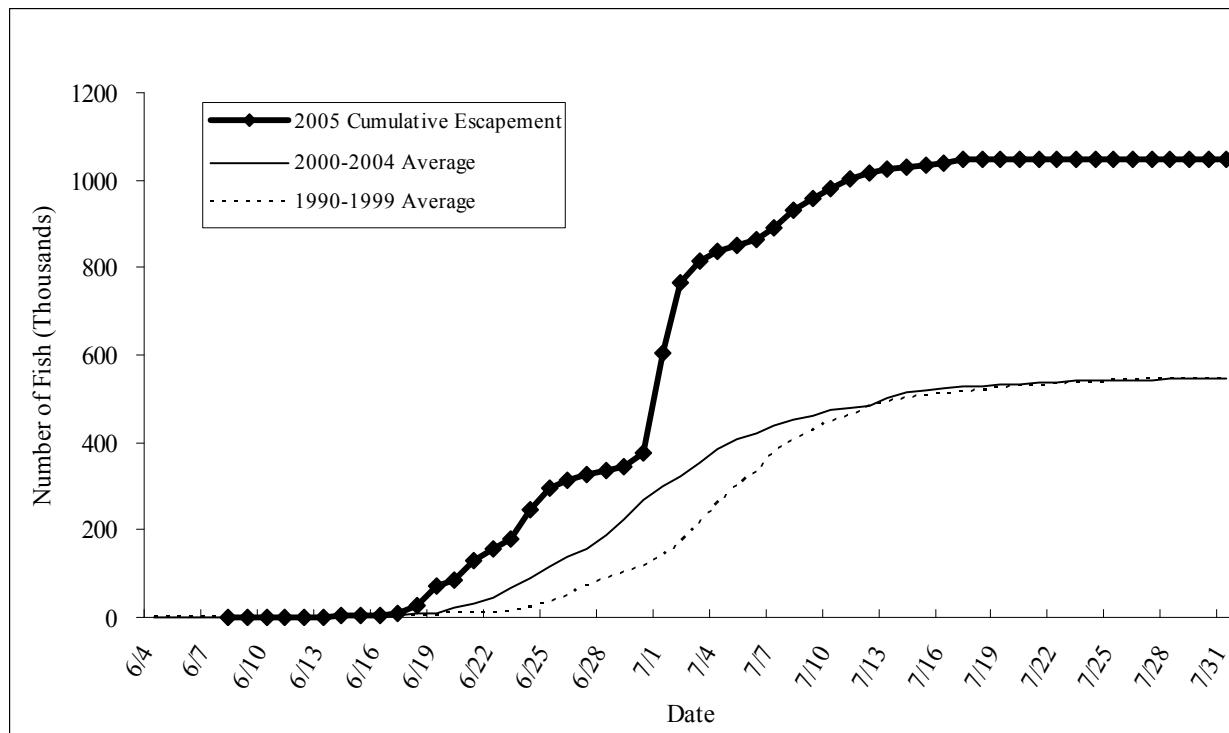
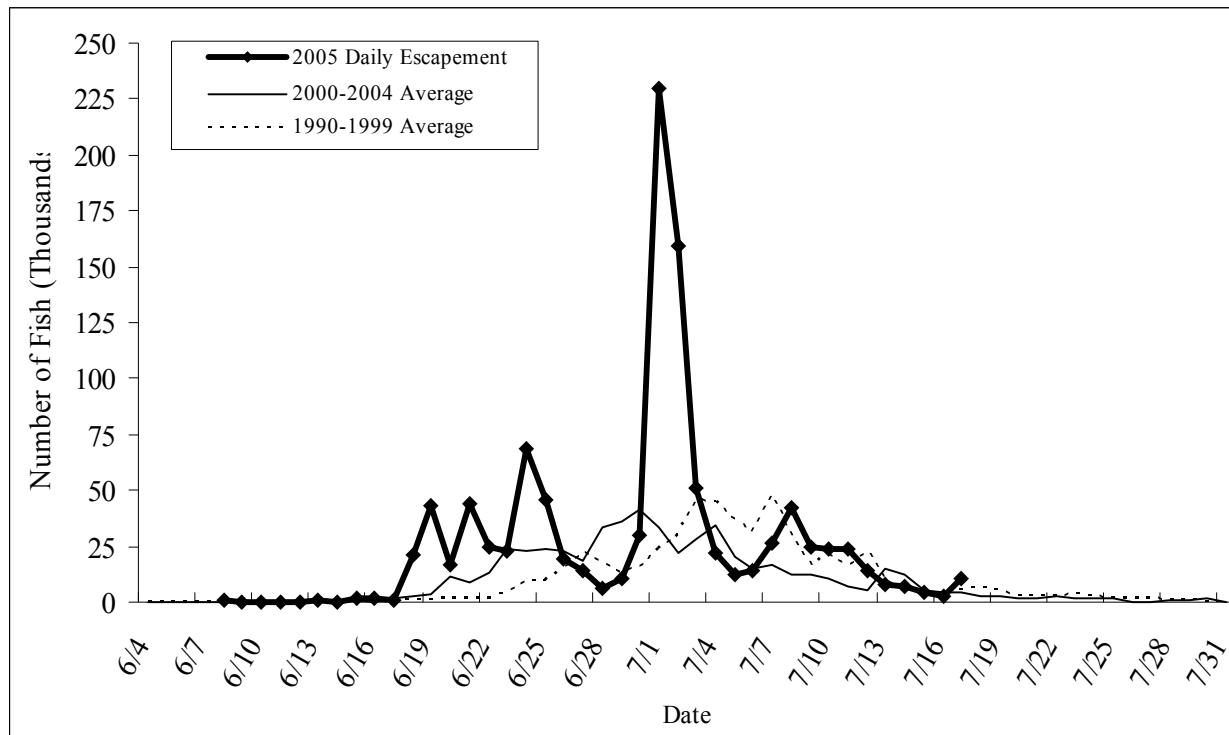


Figure 4.—Average daily (top) and cumulative escapement (bottom) timing for sockeye salmon, Nushagak River sonar project, 4 June to 31 July, 2005.

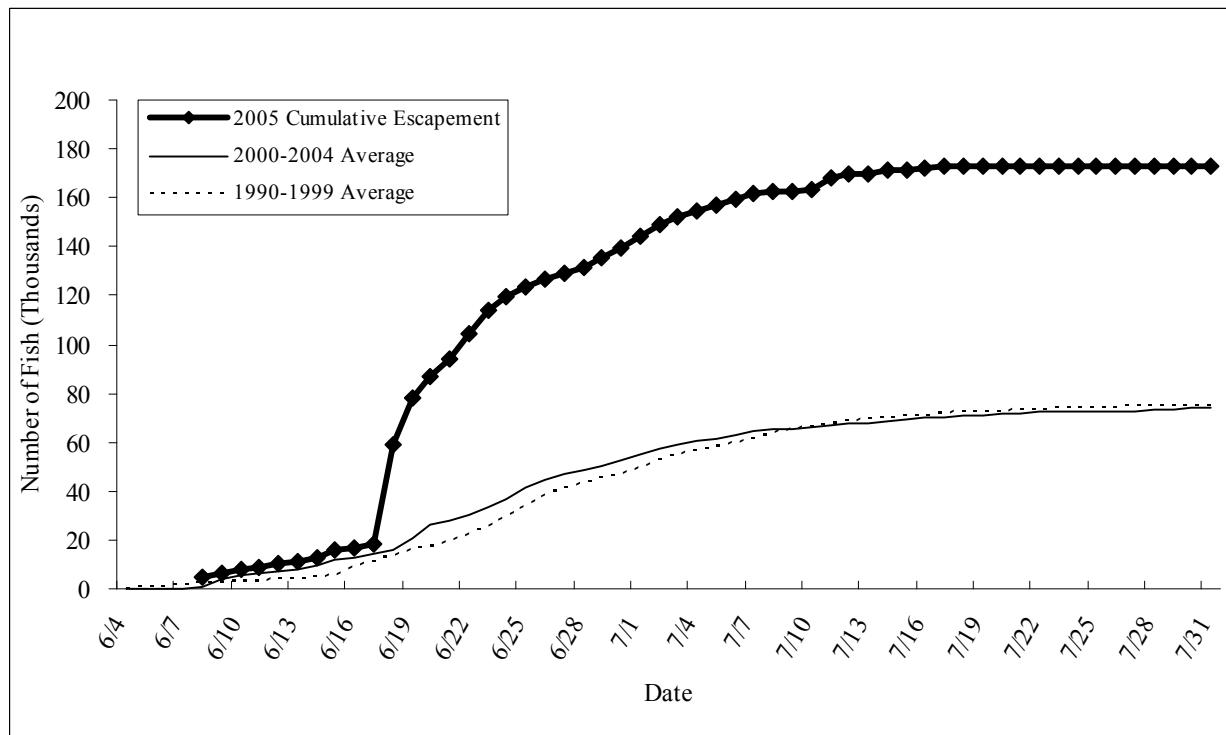
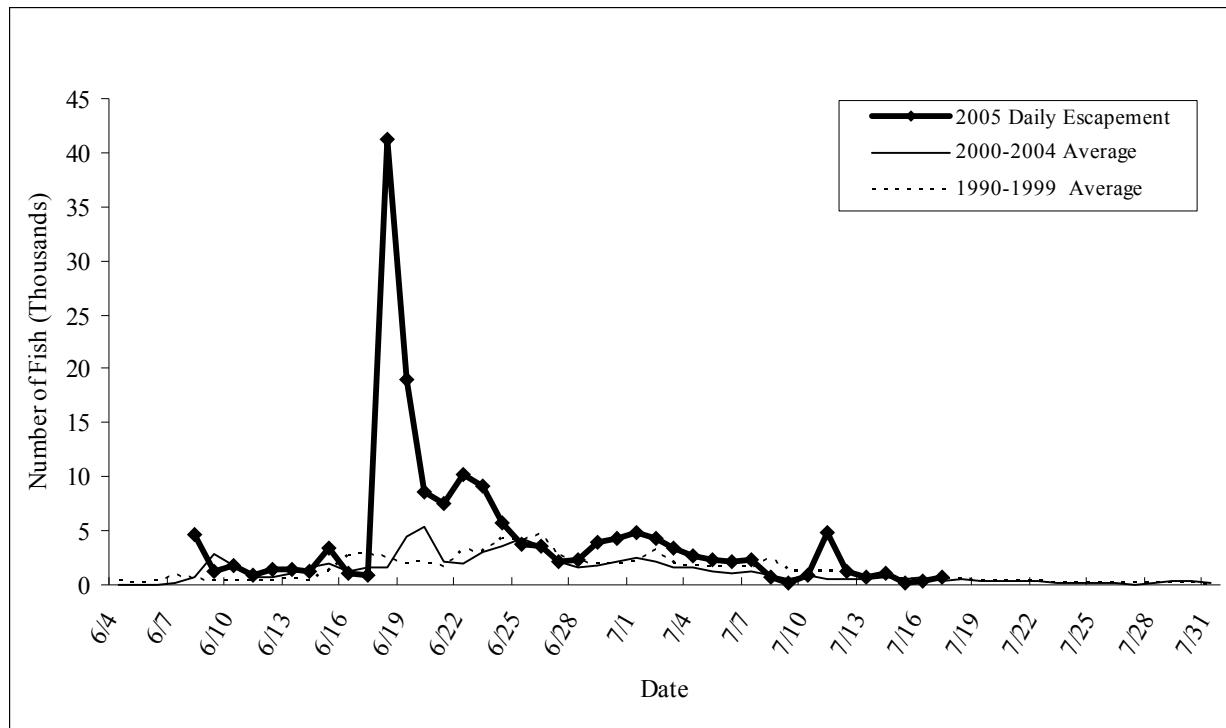


Figure 5.—Average daily (top) and cumulative escapement (bottom) timing for Chinook salmon, Nushagak River sonar project, 4 June to 31 July, 2005.

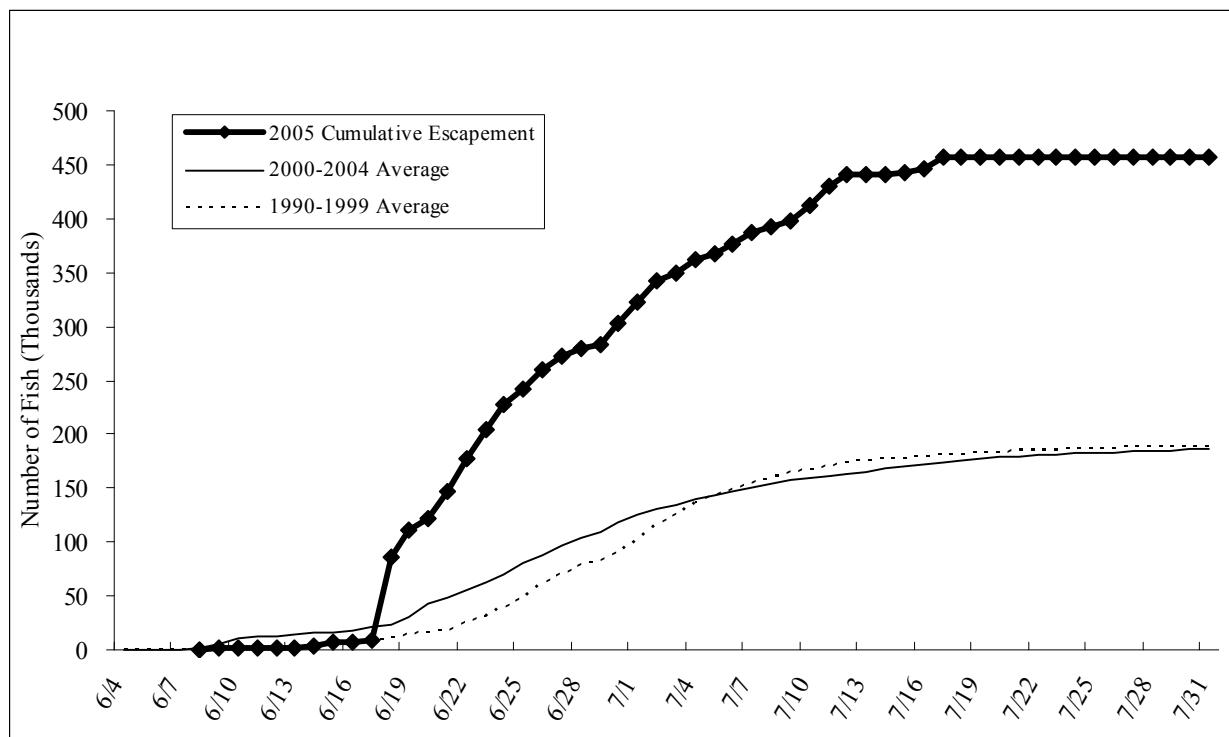
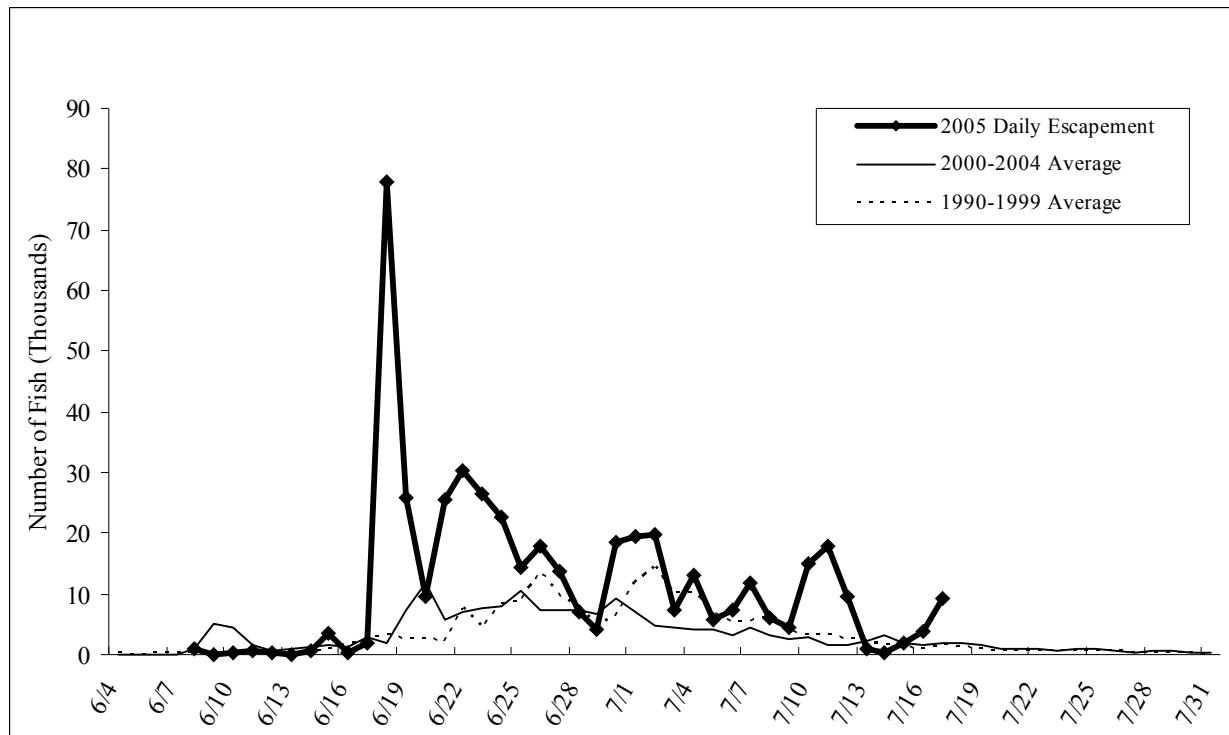


Figure 6.—Average daily (top) and cumulative escapement (bottom) timing for chum salmon, Nushagak River sonar project, 8 June to 10 August, 2005.

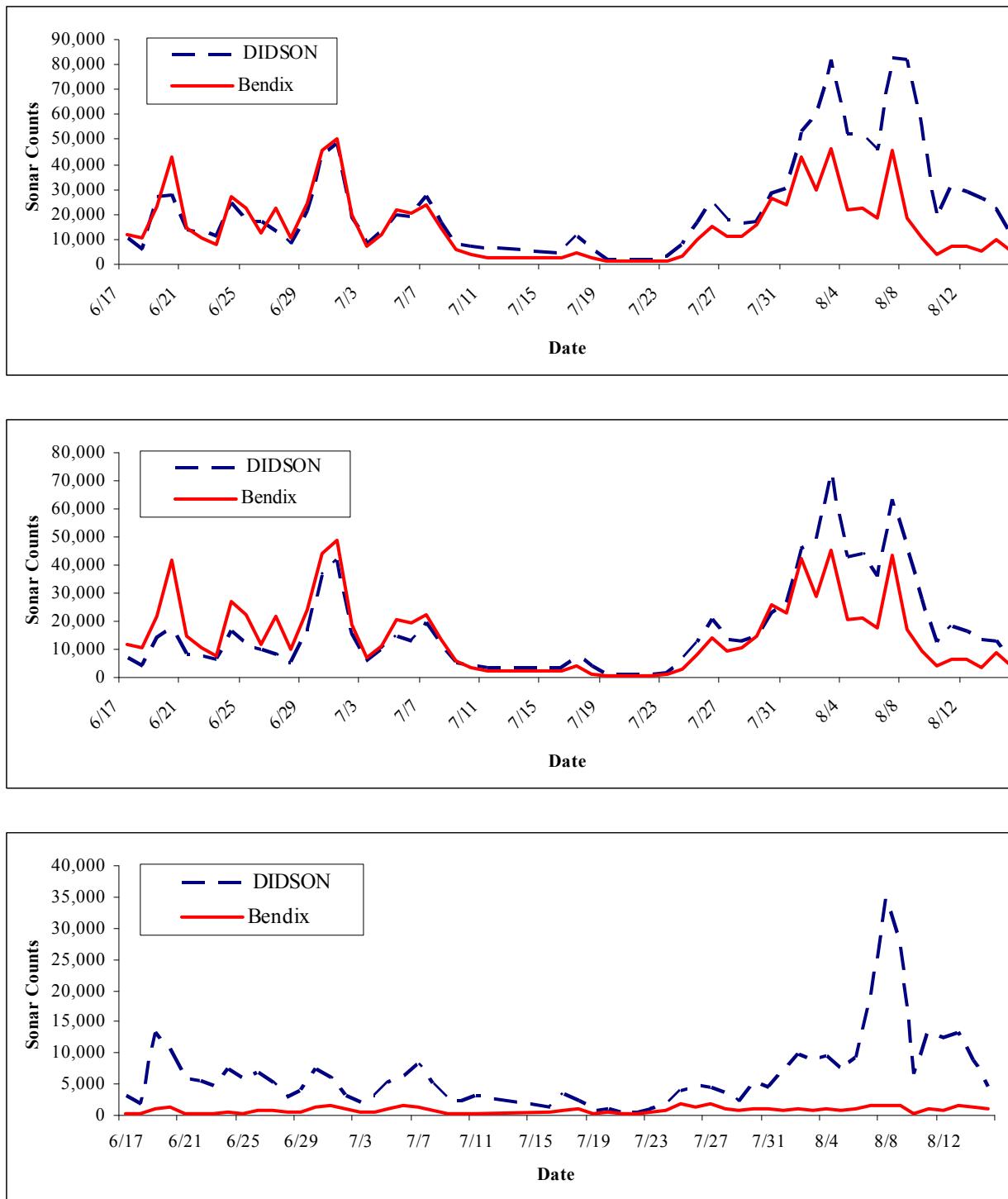


Figure 7.—DIDSON and Bendix right bank paired daily salmon counts, total (top), nearshore stratum (middle), and offshore stratum (bottom), Nushagak River sonar project, 17 June to 15 August, 2004.

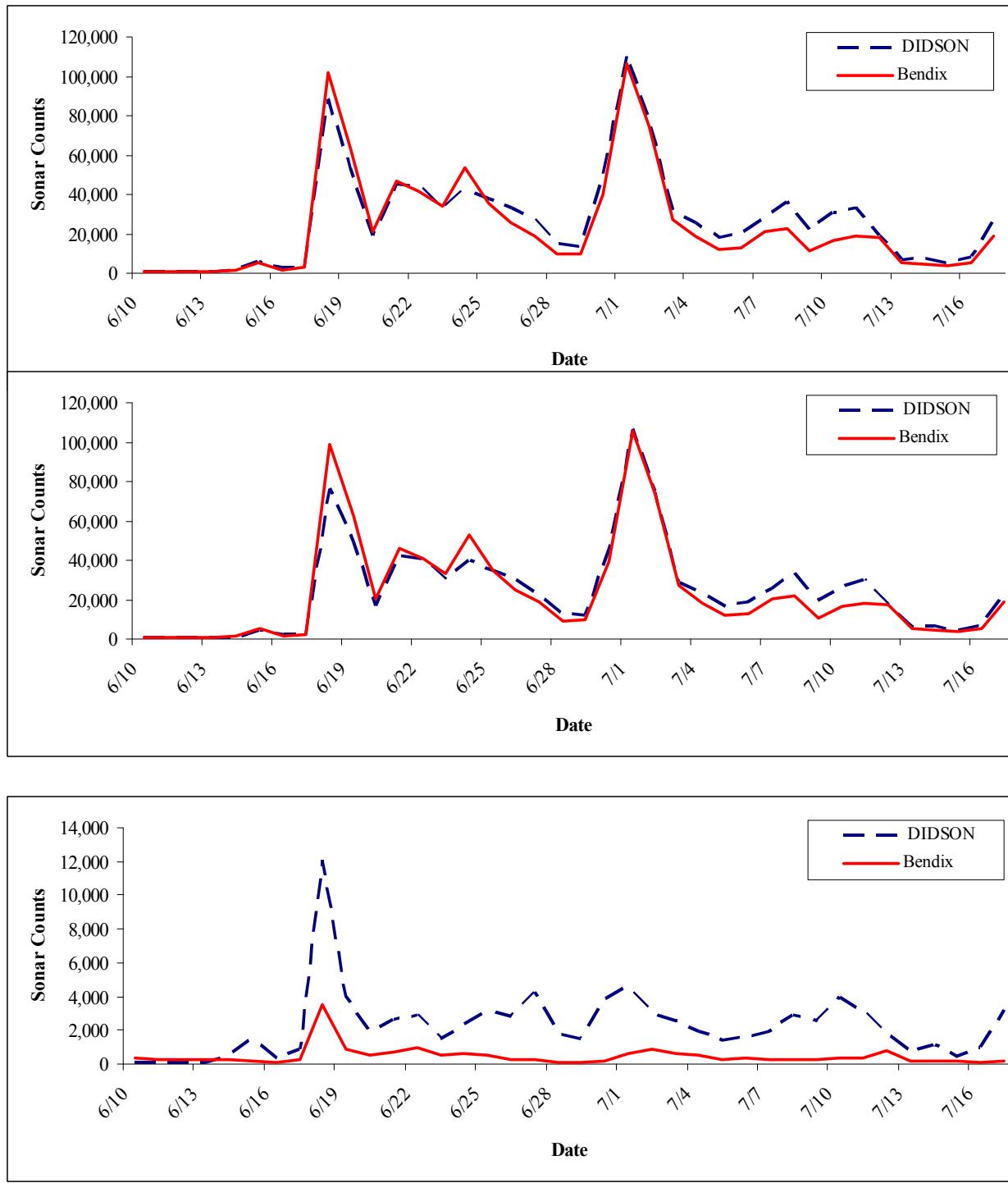


Figure 8.—DIDSON and Bendix right bank paired daily salmon counts, total (top), nearshore stratum (middle), and offshore stratum (bottom), Nushagak River sonar project, 8 June to 17 July, 2005.

APPENDIX A

Appendix A1.—DIDSON hourly salmon counts by date, left bank inshore stratum, Nushagak River sonar project, 2005.

Date	Hour											
	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
6/8	72	66	24	60	24	36	48	24	60	48	60	79
6/9	18	0	18	36	12	6	36	12	12	0	12	6
6/10	0	18	24	36	18	24	18	24	18	0	12	6
6/11	36	6	0	12	6	12	6	6	18	18	-6	0
6/12	0	6	12	18	36	12	12	0	12	12	6	6
6/13	6	12	6	6	6	6	6	6	18	0	6	6
6/14	0	6	12	18	36	12	6	12	18	12	18	-30
6/15	18	61	24	30	66	6	24	0	36	36	12	12
6/16	24	6	6	18	0	18	6	0	61	6	24	72
6/17	30	12	36	30	6	12	12	6	12	30	12	18
6/18	91	42	85	30	42	55	18	6	6	18	60	97
6/19	1,168	744	870	513	72	495	719	672	453	42	761	1,071
6/20	393	453	139	115	133	109	387	169	30	6	18	722
6/21	1,003	1,061	634	690	272	236	732	1,382	1,065	611	188	1,299
6/22	1,975	1,268	622	362	417	381	513	1,035	2,615	906	332	551
6/23	1,274	381	284	181	133	103	1,464	569	664	36	387	611
6/24	3,328	799	436	187	362	381	2,590	2,281	1,740	1,065	54	1,525
6/25	1,438	1,631	769	744	242	616	1,915	2,054	1,537	115	2,366	743
6/26	315	471	284	302	91	333	230	457	145	236	236	290
6/27	1,144	326	562	453	327	211	622	529	211	158	327	97
6/28	315	278	326	368	362	205	254	296	223	387	200	103
6/29	157	85	193	230	248	103	97	284	338	508	97	664
6/30	423	85	242	109	79	460	127	423	121	674	91	611
7/1	3,371	5,548	2,779	3,274	2,603	3,093	5,285	6,812	5,967	2,263	7,950	3,673
7/2	4,594	5,645	5,911	5,167	3,981	4,095	2,977	4,283	8,136	2,142	1,313	2,862
7/3	1,652	1,993	2,481	2,547	1,712	1,262	1,087	941	508	200	327	708
7/4	1,679	1,281	1,250	797	761	616	1,543	485	466	60	164	266
7/5	219	670	551	393	242	248	405	217	139	-6	36	442
7/6	103	175	133	175	387	501	320	502	54	91	24	139
7/7	520	169	501	133	436	622	495	618	85	18	36	1,263
7/8	1,758	1,137	1,407	1,051	1,406	882	1,331	2,214	1,688	61	285	230
7/9	545	803	847	752	725	755	908	830	1,059	413	455	133
7/10	1,023	616	781	707	770	871	815	1,174	972	696	472	617
7/11	2,025	1,130	1,176	912	532	686	920	1,654	1,150	67	230	230
7/12	279	514	173	187	115	55	121	756	442	218	121	508
7/13	291	508	153	193	121	55	73	24	61	212	133	61
7/14	79	206	296	127	115	236	375	175	213	160	180	147
7/15	97	133	115	121	36	42	54	55	218	339	169	109
7/16	0	36	0	6	30	6	30	18	12	91	115	91
7/17	-12	61	30	48	42	0	30	18	133	6	36	43
Total	31,449	28,444	24,192	21,142	17,006	17,858	26,613	31,024	30,719	11,955	17,321	20,079

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Appendix A1.–Page 2 of 2.

Date	Hour											
	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
6/8	12	67	54	121	188	6	18	0	24	54	42	6
6/9	18	12	43	6	24	0	12	0	12	18	6	0
6/10	18	0	12	0	6	12	12	0	24	54	54	12
6/11	12	36	0	0	0	0	0	18	0	0	18	30
6/12	12	61	36	6	6	12	18	0	0	0	0	6
6/13	12	0	18	18	6	24	12	0	18	61	-18	12
6/14	18	12	-6	6	36	6	12	18	6	6	6	30
6/15	61	60	230	97	134	24	12	12	24	36	30	18
6/16	18	0	218	97	0	0	12	12	0	18	6	0
6/17	12	18	18	0	12	12	0	36	48	6	0	18
6/18	133	73	206	375	2,085	5,125	2,027	4,701	1,061	1,830	4,277	2,630
6/19	254	779	1,682	127	103	442	1,047	605	1,027	212	1,192	568
6/20	442	1,218	206	593	193	1,204	1,059	163	121	726	73	1,468
6/21	3,461	1,059	1,815	1,655	861	1,186	1,561	338	85	539	906	912
6/22	1,069	79	72	430	478	698	539	841	376	781	2,281	1,267
6/23	691	175	182	67	374	460	829	1,113	193	2,084	2,947	4,198
6/24	3,449	1,419	1,398	55	1,392	1,682	1,927	3,189	2,287	610	3,358	2,748
6/25	2,620	623	242	36	91	864	465	575	79	489	2,101	1,371
6/26	424	121	109	731	181	48	61	42	115	568	2,971	1,494
6/27	24	24	152	647	314	134	36	30	61	91	115	830
6/28	73	12	91	48	30	48	6	54	-6	163	188	163
6/29	1,234	447	393	321	67	73	109	0	48	363	575	670
6/30	836	54	12	48	18	158	695	1,295	647	315	248	2,136
7/1	2,965	9,130	9,538	11,398	3,262	8,275	12,528	5,255	2,709	6,117	6,182	5,149
7/2	5,494	7,788	2,947	4,731	7,139	4,840	2,446	3,001	3,334	4,364	1,688	3,297
7/3	1,176	1,047	121	2,553	1,603	829	629	375	672	1,208	556	2,970
7/4	467	139	66	145	1,676	701	574	1,000	791	496	272	284
7/5	424	199	42	491	685	296	54	6	242	587	211	127
7/6	296	471	133	230	399	447	575	139	1,021	738	399	1,047
7/7	2,069	502	632	442	230	370	514	2,063	1,042	1,543	1,549	1,482
7/8	1,655	1,782	665	538	903	519	194	278	888	1,458	1,591	1,295
7/9	272	1,023	381	212	350	708	521	354	309	1,204	1,921	1,389
7/10	483	1,349	599	412	1,279	321	430	193	127	832	2,600	2,311
7/11	610	145	121	314	1,377	2,090	2,069	2,799	685	1,378	958	1,250
7/12	127	54	163	345	175	61	85	19	18	346	85	127
7/13	48	54	85	339	175	12	42	55	6	55	48	163
7/14	91	85	115	36	115	73	97	79	0	121	121	145
7/15	60	127	91	206	73	121	24	0	12	42	18	18
7/16	18	85	42	133	6	67	48	73	0	24	12	42
7/17	48	61	30	97	42	97	0	0	0	0	0	0
Total	31,206	30,392	22,954	28,106	26,088	32,044	31,300	28,734	18,105	29,537	39,587	41,687

Appendix A2.—DIDSON hourly salmon counts by date, left bank offshore stratum, Nushagak River sonar project, 2005.

Date	Hour											
	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
6/8	121	103	145	54	54	97	151	218	145	290	157	278
6/9	6	30	6	0	12	6	12	24	30	24	-24	30
6/10	18	0	12	0	6	0	12	0	0	24	6	31
6/11	24	12	24	0	0	12	0	18	18	12	18	18
6/12	0	30	36	36	6	30	48	18	6	6	0	36
6/13	12	12	30	6	18	18	24	18	6	6	6	6
6/14	6	30	36	30	6	6	48	18	12	12	0	6
6/15	61	133	182	127	115	91	85	0	103	0	127	49
6/16	54	18	30	0	24	30	12	54	6	0	12	36
6/17	24	12	18	24	42	6	12	0	0	24	18	48
6/18	236	121	151	91	115	97	61	73	115	115	18	61
6/19	758	690	515	345	261	594	527	364	219	61	569	502
6/20	405	248	163	163	109	436	85	-260	-54	-6	48	145
6/21	1,267	418	382	272	182	399	774	498	224	272	48	79
6/22	255	151	200	176	67	133	508	448	182	42	103	248
6/23	242	242	176	85	91	133	218	607	315	115	66	12
6/24	400	248	109	85	48	242	224	200	460	867	103	79
6/25	157	109	109	133	121	115	67	152	206	158	442	188
6/26	218	91	115	67	61	54	212	61	97	194	1,156	273
6/27	182	273	182	145	103	97	73	48	54	24	218	121
6/28	91	254	218	103	48	115	61	116	55	182	73	128
6/29	18	103	30	85	73	30	0	54	67	127	85	115
6/30	18	24	91	42	36	48	12	91	67	206	139	97
7/1	42	206	417	599	381	623	405	455	353	158	539	636
7/2	255	224	218	194	290	599	176	152	442	164	224	188
7/3	157	169	200	103	169	557	169	121	127	97	133	708
7/4	121	115	109	85	127	169	103	91	103	49	30	48
7/5	61	97	42	18	30	54	91	91	121	36	-12	36
7/6	-6	54	55	67	42	42	73	103	48	6	6	30
7/7	42	224	182	30	91	73	79	109	73	121	203	73
7/8	73	103	109	55	36	36	61	42	115	48	12	79
7/9	36	73	115	61	24	36	61	18	79	91	48	36
7/10	73	103	73	48	36	6	42	12	85	24	67	97
7/11	85	140	85	97	121	85	61	67	109	145	605	85
7/12	255	79	79	42	61	30	218	97	67	55	91	42
7/13	261	85	79	30	61	24	-18	18	18	6	-6	79
7/14	12	0	18	0	6	6	36	73	47	53	47	42
7/15	18	6	12	12	6	18	12	12	24	-6	20	12
7/16	-12	12	6	3	6	6	48	0	18	12	6	0
7/17	-12	6	6	24	12	18	24	0	30	42	18	85
Total	6,033	5,049	4,767	3,539	3,099	5,175	4,867	4,279	4,191	3,857	5,422	4,863

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Date	Hour											
	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
6/8	109	224	121	85	49	36	12	85	30	85	67	85
6/9	36	6	36	0	0	0	18	24	24	6	6	24
6/10	18	6	24	6	48	12	12	79	24	79	61	85
6/11	12	6	31	36	0	42	24	18	24	18	12	6
6/12	24	12	18	0	18	6	0	6	12	24	6	18
6/13	6	49	-6	61	0	36	18	61	61	36	0	12
6/14	6	18	18	42	30	0	6	18	0	61	48	12
6/15	103	145	206	260	18	18	36	79	18	30	30	18
6/16	55	36	212	230	0	6	0	12	0	6	0	6
6/17	12	18	61	18	18	54	6	6	67	18	42	24
6/18	449	121	842	642	762	2,691	1,194	1,093	436	1,125	971	895
6/19	152	55	461	103	91	85	727	405	127	91	236	230
6/20	242	145	55	206	42	200	212	152	152	254	363	442
6/21	103	24	194	224	218	279	224	236	212	164	266	248
6/22	133	97	36	121	163	54	109	157	163	351	218	230
6/23	139	48	91	12	103	188	200	151	576	473	655	697
6/24	182	103	376	532	97	164	183	182	218	115	200	109
6/25	478	230	345	152	24	97	97	496	267	55	212	91
6/26	188	36	67	182	206	73	97	30	109	527	810	152
6/27	48	42	48	823	407	48	24	79	115	176	61	109
6/28	55	48	24	115	139	12	-12	-6	24	48	73	30
6/29	194	24	67	109	30	24	0	6	30	30	12	-12
6/30	230	1,047	42	30	36	164	139	479	91	206	115	67
7/1	176	261	1,277	2,348	1,395	473	794	127	36	333	382	103
7/2	200	248	188	315	371	448	182	164	527	212	145	218
7/3	42	231	97	721	109	188	152	176	261	151	61	194
7/4	61	48	12	18	115	666	157	212	73	54	6	127
7/5	48	55	79	133	67	127	134	30	188	158	48	12
7/6	79	48	232	170	55	36	36	533	6	145	18	224
7/7	103	42	30	279	55	61	139	36	18	48	61	12
7/8	42	24	12	48	30	36	36	158	224	79	85	6
7/9	30	48	103	218	30	48	24	18	121	24	24	55
7/10	42	91	36	327	182	158	43	37	164	54	97	145
7/11	139	163	24	115	242	91	24	97	82	95	54	133
7/12	36	30	24	36	12	12	24	-18	19	182	-6	61
7/13	18	30	24	36	18	18	30	6	6	18	48	30
7/14	-12	30	79	12	55	24	12	6	18	24	-36	61
7/15	42	36	12	6	85	12	0	61	48	12	0	6
7/16	18	18	103	0	24	0	61	140	128	-12	121	121
7/17	12	6	24	12	36	73	0	0	0	0	0	0
Total	4,052	3,955	5,726	8,785	5,384	6,762	5,177	5,630	4,698	5,558	5,574	5,087

Appendix A3.—DIDSON hourly salmon counts by date, right bank inshore stratum, Nushagak River sonar project, 2005.

Date	Hour											
	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
6/8	121	62	57	39	69	91	63	85	90	150	136	104
6/9	83	32	9	9	7	13	18	6	2	24	13	49
6/10	12	9	31	14	14	10	18	31	9	12	37	28
6/11	36	22	13	25	3	33	30	11	43	16	63	40
6/12	103	35	40	13	25	11	36	54	25	25	10	31
6/13	35	17	19	35	31	31	17	30	10	10	15	9
6/14	30	17	41	39	35	25	59	44	49	31	11	40
6/15	236	140	158	219	253	334	418	185	297	109	188	263
6/16	94	61	49	60	47	77	62	58	73	65	71	38
6/17	95	64	95	74	126	187	88	91	64	54	72	46
6/18	466	677	659	896	929	1,065	1,736	2,408	2,376	807	939	928
6/19	4,501	3,934	3,903	2,070	2,454	2,784	2,307	2,598	3,812	2,941	1,851	2,525
6/20	1,599	1,418	1,050	776	333	565	719	657	634	348	367	893
6/21	2,229	2,590	2,177	1,179	1,043	1,458	3,149	2,866	1,737	690	1,123	1,445
6/22	2,924	2,157	1,938	1,780	1,409	1,416	1,146	2,712	1,088	1,232	1,920	1,625
6/23	1,330	1,014	760	450	506	952	1,089	948	1,767	436	846	1,010
6/24	3,458	1,716	1,013	686	700	1,810	2,261	2,211	2,872	1,535	1,031	1,505
6/25	1,570	838	845	755	787	1,398	1,437	1,580	773	608	1,520	1,226
6/26	1,618	1,391	763	557	520	559	902	695	423	135	519	834
6/27	1,690	1,790	1,353	700	623	946	867	568	778	346	83	1,405
6/28	904	746	675	389	262	315	584	710	349	279	96	69
6/29	167	325	387	317	342	273	249	460	502	283	200	106
6/30	1,449	1,060	1,415	1,581	2,227	2,698	1,680	1,033	714	703	527	558
7/1	5,647	4,928	3,342	3,753	3,064	3,430	4,601	4,981	3,634	2,381	2,557	2,927
7/2	4,907	3,713	2,299	1,057	1,542	2,419	2,228	3,438	4,950	1,301	1,054	2,341
7/3	2,459	2,011	1,288	969	222	805	864	1,466	1,473	732	370	642
7/4	806	807	712	534	324	91	543	1,001	1,514	448	342	297
7/5	804	822	638	601	625	185	135	345	439	325	342	237
7/6	431	264	430	482	592	597	209	239	495	665	234	218
7/7	430	401	351	316	344	498	576	127	719	724	1,067	1,066
7/8	888	740	800	978	1,195	1,025	1,312	666	136	568	1,160	1,703
7/9	358	358	234	240	422	600	567	448	265	342	352	990
7/10	310	331	283	513	891	732	980	813	328	104	1,401	532
7/11	897	738	828	976	608	577	661	627	600	292	256	1,337
7/12	871	1,281	2,474	1,393	1,522	736	677	707	743	830	133	642
7/13	156	125	142	188	111	295	310	445	220	184	135	253
7/14	73	83	78	76	111	157	249	310	191	226	216	297
7/15	56	56	87	98	111	130	311	328	318	140	216	205
7/16	62	55	43	79	73	53	71	86	72	69	121	101
7/17	153	142	110	269	549	516	680	1,022	828	658	853	825
Total	44,058	36,970	31,589	25,185	25,051	29,897	33,909	37,090	35,412	20,828	22,447	29,390

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Appendix A3.–Page 2 of 2.

Date	Hour											
	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
6/8	12	205	206	123	37	56	71	70	78	51	52	73
6/9	48	24	51	13	9	24	6	25	30	21	17	20
6/10	73	2	52	24	32	31	38	21	26	45	63	88
6/11	27	27	84	31	28	43	15	24	45	47	52	51
6/12	24	58	75	41	59	24	36	71	51	58	21	35
6/13	37	17	34	57	89	53	41	65	69	63	59	72
6/14	89	52	91	74	83	73	38	44	64	60	66	189
6/15	292	243	264	443	275	76	81	148	124	86	135	92
6/16	68	39	57	22	36	26	42	34	30	43	116	94
6/17	69	28	40	107	43	61	144	126	128	159	247	361
6/18	2,647	5,105	7,491	7,321	9,814	11,681	11,088	8,937	7,172	3,452	5,092	5,061
6/19	2,003	1,873	2,728	1,607	1,672	2,115	2,586	3,593	2,455	2,221	2,430	1,941
6/20	416	858	495	579	742	750	1,621	912	757	1,144	768	1,889
6/21	2,097	2,127	1,370	1,289	2,443	2,282	3,290	1,708	1,063	1,976	1,801	2,833
6/22	1,767	861	1,526	1,432	1,704	1,271	1,525	1,766	1,022	1,780	2,484	1,973
6/23	2,209	1,138	886	856	1,810	1,647	2,009	1,860	1,268	2,586	3,173	2,786
6/24	3,197	4,331	3,560	1,380	2,649	2,818	2,442	3,027	925	1,682	3,325	2,451
6/25	1,370	2,190	2,200	1,223	1,087	977	1,207	2,027	1,726	2,218	2,977	2,412
6/26	814	757	1,501	611	1,035	747	1,197	1,254	1,251	2,854	1,952	2,189
6/27	761	808	951	614	407	590	315	411	532	796	782	882
6/28	902	356	298	287	313	202	155	312	328	273	267	340
6/29	89	302	617	125	239	148	101	141	500	1,089	1,484	1,521
6/30	625	528	914	1,135	2,174	2,076	1,250	664	832	2,769	5,644	5,327
7/1	3,563	5,349	4,278	7,164	7,031	5,884	8,399	3,485	3,724	2,075	4,515	5,142
7/2	3,048	6,136	3,057	3,646	5,203	2,503	4,005	2,267	2,936	2,604	4,120	3,454
7/3	1,263	836	1,140	740	1,584	2,252	1,900	812	474	846	838	897
7/4	750	915	1,024	815	1,379	1,176	778	761	1,101	929	735	444
7/5	460	223	338	404	717	733	817	490	329	788	473	533
7/6	306	279	220	695	1,154	920	865	607	349	906	944	548
7/7	797	418	413	644	1,058	1,759	1,978	984	1,919	1,383	1,225	1,385
7/8	1,029	746	550	742	1,584	1,770	1,117	818	700	883	613	348
7/9	726	220	325	414	571	628	420	284	395	483	597	614
7/10	993	359	199	341	787	737	997	856	733	1,235	952	906
7/11	1,939	881	411	472	752	1,174	631	606	460	719	834	923
7/12	1,173	726	371	512	409	435	394	218	126	289	298	243
7/13	264	296	125	217	320	484	347	210	131	205	168	118
7/14	312	354	248	266	262	281	154	118	139	139	87	88
7/15	258	199	187	231	117	139	87	99	88	66	80	66
7/16	381	501	811	747	443	206	118	198	271	250	162	134
7/17	644	705	1,145	1,527	1,644	1,791	1,393	920	826	689	508	452
Total	37,542	41,072	40,333	38,971	51,795	50,643	53,698	40,973	35,177	39,962	50,156	48,975

Appendix A4.—DIDSON hourly salmon counts by date, right bank offshore stratum, Nushagak River sonar project, 2005.

Date	Hour											
	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
6/8												
6/9	2	6	18	25	167	12	6	18	5	15	5	12
6/10	23	11	7	10	0	2	5	3	3	3	48	
6/11		3	37	2	0	17	8	2	23	3	0	36
6/12	9	17	41	10	1	15	20	17	11	5	4	40
6/13	0	1	4	3	1	13	10	5	5	12	20	2
6/14	9	11	32	6	6	22	12	2	0	0	7	11
6/15	14	15	5	12	4	0	9	5	0	37	23	9
6/16	2	1	0	0	2	18	2	14	13	17	4	6
6/17	17	9	2	0	4	16	4	7	4	29	44	4
6/18	10	30	39	25	1	7	2	9	40	33	40	25
6/19	52	56	18	14	32	27	18	26	77	21	16	52
6/20	2	1	17	4	2	7	3	13	7	10	19	16
6/21	25	18	18	3	17	8	13	17	20	14	92	51
6/22	11	63	66	13	14	12	23	30	39	65	34	54
6/23	0	5	14	27	1	37	5	3	19	16	26	21
6/24	20	30	29	11	7	20	3	7	2	20	30	21
6/25	77	51	64	37	24	20	10	11	5	10	17	19
6/26	18	6	7	1	5	19	9	8	11	4	6	29
6/27	12	11	13	7	11	1	14	2	11	19	5	5
6/28	12	5	6	1	4	2	5	3	5	7	9	4
6/29	4	6	3	7	4	0	1	2	1	0	3	2
6/30	7	2	17	6	7	14	20	8	3	9	6	6
7/1	11	8	5	5	6	4	12	29	32	35	31	40
7/2	31	26	17	14	14	23	14	17	54	48	49	35
7/3	47	61	29	6	16	45	18	17	17	43	18	31
7/4	23	35	28	14	18	13	44	57	26	29	14	7
7/5	25	46	17	17	11	9	4	10	7	19	9	5
7/6	18	24	22	13	10	7	19	4	14	20	9	16
7/7	22	14	21	8	15	18	6	12	19	17	29	23
7/8	7	21	28	15	7	17	10	11	5	2	12	23
7/9	11	7	23	10	13	8	13	11	7	6	20	11
7/10	9	17	25	26	11	42	14	16	22	3	12	24
7/11	41	37	53	54	25	19	10	11	22	9	0	6
7/12	17	38	61	445	95	15	2	6	15	9	7	6
7/13	9	12	1	5	6	6	3	7	6	12	3	9
7/14	8	3	8	4	13	5	6	8	14	11	22	3
7/15	4	0	6	5	8	3	11	8	5	0	15	4
7/16	2	1	4	0	0	6	7	0	9	2	3	4
7/17	8	12	9	5	3	9	7	9	5	2	4	10
Total	619	720	814	870	585	538	402	445	583	616	715	682

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Date	Hour											
	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
6/8			30	1	62	15	17	9	37	34	44	12
6/9	34	0	33	1	0	1	0	2	2	3	2	15
6/10	80	67	10	1	5	11	26	38	27	16	17	2
6/11	21	3	5	4	2	2	5	2	52	5	5	10
6/12	34	67	9	5	6	4	0	2	7	49	3	5
6/13	3	0	13	11	2	4	2	25	10	72	2	6
6/14	7	3	19	11	15	11	11	6	3	18	16	30
6/15	4	13	7	5	6	4	7	8	3	4	1	2
6/16	5	2	0	5	3	3	7	1	0	0	8	9
6/17	7	15	0	3	5	3	2	17	8	14	2	6
6/18	25	180	244	311	509	351	672	598	97	85	79	90
6/19	24	56	47	44	30	37	48	62	35	21	30	5
6/20	31	22	19	38	55	66	43	29	36	25	35	15
6/21	22	20	24	22	44	62	35	46	24	41	54	33
6/22	33	33	159	40	16	24	25	30	76	51	42	10
6/23	43	53	12	13	22	21	41	35	44	26	21	57
6/24	77	54	28	30	36	6	32	49	18	61	41	14
6/25	10	27	32	24	24	7	25	13	9	13	30	2
6/26	16	9	16	14	11	11	11	9	23	16	17	10
6/27	15	32	15	12	4	2	3	11	6	6	3	3
6/28	3	3	3	4	9	5	2	0	1	4	4	5
6/29	5	3	1	2	5	2	1	0	4	0	1	4
6/30	3	9	24	6	5	12	14	5	3	7	0	6
7/1	43	71	124	22	0	2	30	8	9	0	9	37
7/2	26	62	61	41	37	54	62	33	45	22	41	30
7/3	27	16	26	30	15	10	13	18	26	6	23	24
7/4	14	15	28	24	13	39	32	13	14	24	20	14
7/5	4	14	16	9	11	10	7	9	3	10	6	6
7/6	5	8	4	5	13	11	14	13	9	17	19	23
7/7	18	26	3	2	15	10	9	6	2	5	2	5
7/8	19	14	4	10	22	8	7	6	5	12	8	11
7/9	18	10	2	6	7	9	11	4	1	10	12	5
7/10	35	13	11	10	8	11	6	13	12	4	7	9
7/11	8	0	18	3	10	6	4	7	8	16	2	6
7/12	4	3	4	10	6	3	5	0	3	6	1	5
7/13	2	5	3	10	1	5	3	10	8	2	6	10
7/14	6	11	5	12	9	13	4	1	3	3	11	11
7/15	15	8	7	12	3	1	7	3	1	5		3
7/16	2	11	4	10	11	2	0	4	0	4	5	2
7/17	3	5	5	9	15	12	10	7	11	6	6	4
Total	751	963	1,075	832	1,072	870	1,253	1,152	685	723	635	556

Appendix A5.—Bendix salmon counts by date and sector, right bank inshore stratum, Nushagak River sonar project, 2005.

Date	Sector												Daily Total	Cumulative Total
	1	2	3	4	5	6	7	8	9	10	11	12		
6/08	29	32	70	161	225	373	331	211	160	116	115	278	2,101	2,101
6/09	11	3	19	44	62	113	61	62	57	34	44	43	553	2,654
6/10	23	13	16	26	79	151	81	94	68	30	81	58	720	3,374
6/11	32	11	27	53	102	195	90	101	78	27	43	50	809	4,183
6/12	62	10	13	34	111	186	90	124	105	52	67	107	961	5,144
6/13	63	19	29	69	141	144	64	122	100	40	76	48	915	6,059
6/14	62	14	33	86	201	293	126	139	114	48	130	98	1,344	7,403
6/15	9	7	110	493	878	1,234	574	689	427	154	286	198	5,059	12,462
6/16	34	23	49	167	227	277	142	139	106	53	74	71	1,362	13,824
6/17	35	15	45	186	367	522	416	281	227	158	186	131	2,569	16,393
6/18	171	123	5,522	18,913	22,841	18,208	12,554	7,584	5,506	2,939	2,766	1,620	98,747	115,140
6/19	132	1,192	8,677	17,528	14,471	8,747	5,190	2,690	1,849	945	962	521	62,904	178,044
6/20	3	142	1,320	3,334	4,843	4,275	2,941	1,430	887	430	396	289	20,290	198,334
6/21	9	371	3,899	10,548	12,650	9,220	4,885	2,111	1,063	474	464	271	45,965	244,299
6/22	35	618	4,161	7,939	9,145	7,883	5,340	2,560	1,318	619	503	337	40,458	284,757
6/23	34	159	1,480	5,193	8,314	7,865	5,151	2,532	1,282	672	436	218	33,336	318,093
6/24	1,069	180	2,520	9,292	13,492	11,454	7,282	3,629	1,791	923	645	308	52,585	370,678
6/25	91	239	1,861	4,776	7,153	7,548	5,666	3,831	1,829	1,025	577	355	34,951	405,629
6/26	231	46	370	1,667	3,971	5,185	5,293	3,438	2,466	1,203	812	396	25,078	430,707
6/27	125	36	155	1,164	2,436	3,527	3,695	2,877	2,200	1,332	980	471	18,998	449,705
6/28	158	28	83	473	1,023	1,679	1,766	1,559	1,196	635	577	234	9,411	459,116
6/29	116	52	86	713	1,929	2,244	1,731	1,273	867	493	346	117	9,967	469,083
6/30	532	2,228	8,094	10,695	8,567	4,968	2,057	976	557	354	271	284	39,583	508,666
7/01	338	11,245	32,308	29,458	16,488	8,011	3,685	1,501	882	515	429	994	105,854	614,520
7/02	224	3,049	12,173	18,214	16,608	12,247	6,123	2,185	1,218	648	520	1,019	74,228	688,748
7/03	334	573	3,011	4,410	5,835	5,537	3,004	1,537	886	589	436	731	26,883	715,631
7/04	165	230	1,066	2,770	4,432	4,368	2,254	1,087	677	405	351	421	18,226	733,857
7/05	100	122	657	1,487	2,653	2,863	1,664	884	533	291	296	253	11,803	745,660
7/06	204	87	610	1,683	2,840	2,710	1,752	1,017	665	357	375	349	12,649	758,309
7/07	108	154	934	2,413	4,058	4,734	3,272	1,795	1,206	766	615	527	20,582	778,891

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Date	Sector												Daily Total	Cumulative Total
	1	2	3	4	5	6	7	8	9	10	11	12		
7/08	67	184	1,293	2,923	4,771	4,898	3,266	1,757	1,207	743	617	345	22,071	800,962
7/09	55	50	277	894	2,138	2,543	1,689	980	880	578	532	237	10,853	811,815
7/10	146	277	1,357	3,047	3,744	2,892	1,569	928	752	620	656	325	16,313	828,128
7/11	119	234	1,062	2,441	3,986	4,210	2,352	1,292	945	694	607	257	18,199	846,327
7/12	40	70	405	1,213	2,943	3,747	2,592	1,586	1,445	1,338	1,147	677	17,203	863,530
7/13	46	60	89	290	832	1,227	900	551	506	360	281	307	5,449	868,979
7/14	35	48	33	82	262	535	745	687	668	496	492	432	4,515	873,494
7/15	94	46	75	164	496	736	720	399	329	207	204	203	3,673	877,167
7/16	56	53	69	183	390	785	905	755	554	469	469	419	5,107	882,274
7/17	208	111	258	1,755	3,219	3,081	2,503	1,947	1,903	1,432	1,294	1,138	18,849	901,123
Total	5,405	22,154	94,316	166,981	188,923	161,415	104,521	59,340	39,509	23,264	20,158	15,137	901,123	

Appendix A6.—Bendix salmon counts by date and sector, right bank offshore stratum, Nushagak River sonar project, 2005.

Date	Sector																Daily Total	Cumulative Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
6/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/09	0	2	5	0	0	0	0	12	7	2	0	0	0	0	0	0	28	28
6/10	7	6	0	0	0	0	0	3	1	0	0	0	0	0	0	0	17	45
6/11	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	4	49
6/12	0	5	22	22	11	22	36	35	20	4	0	0	0	0	0	0	177	226
6/13	0	10	12	4	8	10	28	40	37	40	1	0	0	0	5	5	200	426
6/14	0	0	12	8	5	11	24	18	44	7	0	0	0	0	0	0	129	555
6/15	1	2	0	4	4	2	0	4	21	14	0	0	0	0	0	0	52	607
6/16	7	4	1	1	0	1	2	3	15	16	4	0	0	0	0	0	54	661
6/17	0	1	15	4	5	12	12	29	52	80	11	0	0	0	0	0	221	882
6/18	4	51	57	41	15	4	13	18	46	110	10	2	0	0	0	0	371	1,253
6/19	0	16	39	25	16	13	78	170	266	303	32	0	0	0	0	0	958	2,211
6/20	0	76	221	148	54	50	133	155	234	225	23	0	1	1	0	0	1,321	3,532
6/21	0	8	21	10	21	7	17	15	61	55	3	0	0	0	0	0	218	3,750
6/22	0	9	29	11	4	8	5	24	32	26	7	0	0	0	1	0	156	3,906
6/23	0	7	14	24	2	8	19	14	62	64	3	0	0	0	0	1	218	4,124
6/24	4	26	55	32	43	77	92	45	79	33	8	3	2	0	0	0	499	4,623
6/25	2	22	15	20	25	24	33	9	31	12	2	0	0	0	0	0	195	4,818
6/26	0	16	122	136	68	69	18	32	169	74	8	11	8	13	11	7	762	5,580
6/27	1	33	120	133	59	92	33	38	120	68	10	4	3	2	3	5	724	6,304
6/28	2	14	59	94	38	47	19	25	59	23	8	5	9	4	4	1	411	6,715
6/29	17	50	115	107	36	38	13	56	97	34	15	7	10	8	4	2	609	7,324
6/30	2	68	323	231	79	58	16	30	215	98	48	32	27	32	25	25	1,309	8,633
7/01	15	119	405	203	63	41	23	67	216	154	43	46	67	79	42	31	1,614	10,247
7/02	6	35	166	131	30	58	12	28	182	103	55	28	49	43	29	17	972	11,219
7/03	7	9	63	90	23	24	14	12	52	32	12	12	13	15	8	16	402	11,621
7/04	13	26	90	115	22	27	10	20	79	65	11	7	12	12	12	20	541	12,162
7/05	9	23	130	196	41	52	4	30	189	155	69	36	74	37	51	48	1,144	13,306

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Date	Sector																Daily Total	Cumulative Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
7/06	5	46	234	219	49	36	13	32	240	221	109	70	98	83	59	24	1,538	14,844
7/07	5	79	229	196	38	39	11	36	221	248	48	35	103	65	24	27	1,404	16,248
7/08	2	37	165	109	29	32	12	20	113	95	43	53	23	28	39	26	826	17,074
7/09	5	11	56	80	30	17	11	7	69	29	9	8	13	7	10	10	372	17,446
7/10	4	34	53	53	9	11	4	8	32	23	5	2	3	9	13	1	264	17,710
7/11	2	9	33	79	9	10	0	7	38	24	4	4	4	4	4	6	237	17,947
7/12	3	2	24	48	14	7	3	5	35	20	11	3	5	5	2	8	195	18,142
7/13	6	23	31	36	1	3	2	3	23	27	11	19	33	32	14	2	266	18,408
7/14	30	118	130	42	3	1	20	27	53	49	68	102	120	121	126	119	1,129	19,537
7/15	15	84	123	36	1	9	28	35	62	92	75	108	148	145	107	96	1,164	20,701
7/16	8	17	63	41	2	2	9	13	20	20	42	46	70	47	52	79	531	21,232
7/17	18	79	107	60	4	5	12	40	53	52	64	63	93	86	73	97	906	22,138
Total	200	1,177	3,359	2,789	861	927	779	1,165	3,346	2,700	872	706	988	878	718	673	22,138	

APPENDIX B

Appendix B1.—Climatological observations for the Nushagak River, 2005.

Date	Cloud Cover ^a		Precipitation (mm)	Wind Direction & Velocity (k/hr)		Air Temperature (°C)		Water Temperature (°C)		Water Color
	800	2000		800	2000	800	2000	800	2000	
6/08	4	4	Tr	SE 10	n	n	n	n	n	Light Brown
6/09	n	n	n	n	n	n	n	n	n	n
6/10	4	n	0.20	n	Calm	n	18.0	n	n	Light Brown
6/11	4	3	0.48	Calm	S 5	16.0	18.0	11.0	12.0	Light Brown
6/12	2	3	0.40	W 10	Calm	18.0	n	12.0	11.0	Light Brown
6/13	2	2	0.00	Calm	SW 30	14.0	20.0	11.0	12.0	Light Brown
6/14	3	1	0.24	SW 5	Calm	14.0	25.0	11.0	14.0	Light Brown
6/15	2	1	0.00	Calm	Calm	14.0	24.0	12.0	13.0	Light Brown
6/16	1	1	0.00	Calm	Calm	13.0	25.0	13.0	15.5	Light Brown
6/17	3	4	0.32	SE 25	SE 35	12.0	16.0	13.5	14.0	Light Brown
6/18	4	4	0.64	W 15	W 20	13.0	10.0	13.0	13.0	Light Brown
6/19	4	1	0.32	W 20	W 20	13.0	10.0	12.0	12.0	Light Brown
6/20	1	1	0.20	Calm	W 15	6.0	19.0	11.0	13.0	Light Brown
6/21	2	4	Tr	W 10	W 10	10.0	11.0	12.0	12.0	Light Brown
6/22	4	4	0.20	Calm	Calm	13.0	12.0	12.0	12.0	Light Brown
6/23	4	4	Tr	SE 5	Calm	13.0	15.0	12.0	13.0	Light Brown
6/24	3	3	0.00	Calm	S 15	12.5	17.0	13.0	13.5	Light Brown
6/25	4	2	0.50	Calm	Calm	16.0	18.0	12.0	14.0	Light Brown
6/26	1	2	0.00	Calm	Calm	13.0	25.0	12.5	16.5	Light Brown
6/27	1	1	Tr	Calm	Calm	13.0	29.0	12.5	18.0	Light Brown
6/28	1	2	Tr	Calm	S 5	13.0	24.0	15.0	17.0	Light Brown
6/29	4	2	0.16	Calm	W 15	15.5	17.0	15.0	16.0	Light Brown
6/30	4	n	n	SW 20	S 20	14.0	n	15.5	n	Light Brown

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Appendix B1.–Page 2 of 2.

Date	Cloud Cover ^a		Precipitation (mm)	Wind Direction & Velocity (k/hr)		Air Temperature (°C)		Water Temperature (°C)		Water Color
	800	2000		800	2000	800	2000	800	2000	
7/01	2	2	0.00	Calm	W 5	16.0	16.0	15.0	14.0	Light Brown
7/02	3	1	0.20	Calm	Calm	16.0	22.0	15.0	16.0	Light Brown
7/03	3	2	0.00	Calm	Calm	11.5	22.0	15.0	15.0	Light Brown
7/04	3	3	0.40	Calm	SW 10	15.0	18.0	15.0	16.0	Light Brown
7/05	4	1	Tr	Calm	S 10	12.0	19.0	15.0	17.0	Light Brown
7/06	5	3	0.25	Calm	S 5	14.0	18.0	16.0	16.0	Light Brown
7/07	5	1	0.00	Calm	S 5	12.0	21.0	16.0	17.0	Light Brown
7/08	5	1	0.00	S 5	W 15	12.0	23.0	16.0	18.0	Light Brown
7/09	1	1	0.00	SW 5	SW 15	14.0	19.0	17.0	18.0	Light Brown
7/10	4	1	0.00	S 20	SW 25	13.5	17.0	17.0	18.0	Light Brown
7/11	4	4	Tr	S 5	SW 5	12.0	12.0	17.0	16.0	Light Brown
7/12	4	3	0.20	NE 7	Calm	11.0	15.5	15.0	16.0	Light Brown
7/13	2	2	0.02	Calm	NW 10	9.0	22.0	14.0	15.0	Light Brown
7/14	1	1	Tr	Calm	Calm	9.0	23.0	14.0	17.0	Light Brown
7/15	2	4	0.10	S 10	SE 25	13.0	15.0	15.0	16.0	Light Brown
7/16	4	4	0.60	Calm	Calm	12.0	15.0	15.0	16.0	Light Brown
7/17	5	4	0.00	Calm	SW 20	10.0	16.0	15.5	16.0	Light Brown

^a Cloud cover: 1 = cloud cover is less than 1/10 of sky, 2 = cloud cover not more than 1/2 of sky, 3 = cloud cover is more than 1/2 of sky, 4 = clouds completely cover the sky, 5 = fog or thick haze

APPENDIX C

Appendix C1.—DIDSON and Bendix right bank total paired daily salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Date	DIDSON Daily Counts	Bendix Daily Counts	Difference	Percent Deviation
6/17	10,270	12,086	1,816	
6/18	6,262	10,721	4,459	
6/19	27,151	22,930	-4,221	
6/20	27,495	42,927	15,432	
6/21	13,926	14,727	801	
6/22	13,164	10,516	-2,648	
6/23	11,023	7,755	-3,268	
6/24	24,235	27,352	3,117	
6/25	17,627	22,289	4,662	
6/26	16,901	12,284	-4,617	
6/27	13,382	22,582	9,200	
6/28	8,224	10,643	2,419	
6/29	20,896	24,440	3,544	
6/30	44,256	45,531	1,275	
7/1	48,043	50,416	2,373	
7/2	18,830	20,085	1,255	
7/3	7,860	7,490	-370	
7/4	13,451	11,622	-1,829	
7/5	19,846	21,823	1,977	
7/6	19,102	20,774	1,672	
7/7	27,432	23,895	-3,537	
7/8	16,625	14,503	-2,122	
7/9	8,051	6,264	-1,787	
7/10	7,322	4,020	-3,302	
7/11	6,921	2,682	-4,239	
7/16	4,588	2,538	-2,050	
7/17	11,187	4,904	-6,283	
7/18	6,214	2,408	-3,806	
7/19	2,005	1,078	-927	
7/20	2,205	1,191	-1,014	
7/21	1,749	1,101	-648	
7/22	2,082	1,125	-957	
7/23	3,125	1,530	-1,595	
7/24	8,233	3,404	-4,829	
7/25	16,401	10,191	-6,210	
7/26	25,419	15,194	-10,225	
7/27	17,960	11,380	-6,580	
7/28	16,414	11,333	-5,081	
7/29	16,900	15,592	-1,308	
7/30	28,458	26,711	-1,747	
7/31	30,167	23,875	-6,292	
8/1	53,177	43,133	-10,044	
8/2	59,229	30,046	-29,183	
8/3	81,828	46,246	-35,582	
8/4	52,494	21,751	-30,743	
8/5	51,575	22,194	-29,381	
8/6	45,420	18,838	-26,582	
8/7	82,650	45,343	-37,307	
8/8	82,153	18,491	-63,662	
8/9	55,060	10,714	-44,346	
8/10	18,622	4,287	-14,335	
8/11	32,019	7,449	-24,570	
8/12	28,896	7,104	-21,792	
8/13	26,557	5,289	-21,268	
8/14	21,641	10,210	-11,431	
8/15	11,467	5,202	-6,265	
Total	1,344,193	900,209	-443,984	-33.0%

Appendix C2.—DIDSON and Bendix right bank inshore stratum paired daily salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Date	DIDSON	Bendix	Difference	Percent Deviation
	Inshore	Inshore		
6/17	7,194	11,865	4,671	
6/18	4,290	10,350	6,060	
6/19	13,928	21,972	8,044	
6/20	16,881	41,606	24,725	
6/21	7,950	14,509	6,559	
6/22	7,527	10,360	2,833	
6/23	6,242	7,537	1,295	
6/24	16,750	26,853	10,103	
6/25	11,499	22,094	10,595	
6/26	9,892	11,522	1,630	
6/27	8,157	21,858	13,701	
6/28	5,349	10,232	4,883	
6/29	17,050	23,831	6,781	
6/30	36,708	44,222	7,514	
7/1	42,014	48,802	6,788	
7/2	15,586	19,113	3,527	
7/3	5,827	7,088	1,261	
7/4	10,165	11,081	916	
7/5	14,646	20,679	6,033	
7/6	12,916	19,236	6,320	
7/7	19,247	22,491	3,244	
7/8	11,646	13,677	2,031	
7/9	5,282	5,892	610	
7/10	4,847	3,756	-1,091	
7/11	3,636	2,445	-1,191	
7/16	3,309	2,116	-1,193	
7/17	7,720	3,998	-3,722	
7/18	3,854	1,240	-2,614	
7/19	1,216	745	-471	
7/20	1,271	765	-506	
7/21	1,277	752	-525	
7/22	1,440	834	-606	
7/23	2,015	1,045	-970	
7/24	6,360	2,704	-3,656	
7/25	12,452	8,311	-4,141	
7/26	20,768	13,845	-6,923	
7/27	13,488	9,469	-4,019	
7/28	12,712	10,320	-2,392	
7/29	14,690	14,862	172	
7/30	23,226	25,630	2,404	
7/31	25,744	22,874	-2,870	
8/1	46,114	42,369	-3,745	
8/2	49,329	29,001	-20,328	
8/3	72,845	45,373	-27,472	
8/4	42,987	20,778	-22,209	
8/5	44,047	21,268	-22,779	
8/6	36,133	17,900	-18,233	
8/7	63,556	43,772	-19,784	
8/8	47,332	16,782	-30,550	
8/9	27,632	9,181	-18,451	
8/10	12,065	3,904	-8,161	
8/11	18,448	6,382	-12,066	
8/12	16,336	6,265	-10,071	
8/13	13,281	3,774	-9,507	
8/14	12,869	8,832	-4,037	
8/15	6,982	4,142	-2,840	
Total	976,728	852,304	-124,424	-12.7%

Appendix C3.—DIDSON and Bendix right bank offshore stratum paired daily salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Date	DIDSON Offshore	Bendix Offshore	Difference	Percent Deviation
6/17	3,076	221	-2,855	
6/18	1,972	371	-1,601	
6/19	13,223	958	-12,265	
6/20	10,614	1,321	-9,293	
6/21	5,976	218	-5,758	
6/22	5,638	156	-5,482	
6/23	4,781	218	-4,563	
6/24	7,485	499	-6,986	
6/25	6,128	195	-5,933	
6/26	7,009	762	-6,247	
6/27	5,224	724	-4,500	
6/28	2,875	411	-2,464	
6/29	3,845	609	-3,236	
6/30	7,549	1,309	-6,240	
7/1	6,029	1,614	-4,415	
7/2	3,244	972	-2,272	
7/3	2,033	402	-1,631	
7/4	3,286	541	-2,745	
7/5	5,200	1,144	-4,056	
7/6	6,187	1,538	-4,649	
7/7	8,185	1,404	-6,781	
7/8	4,978	826	-4,152	
7/9	2,769	372	-2,397	
7/10	2,475	264	-2,211	
7/11	3,285	237	-3,048	
7/16	1,279	422	-857	
7/17	3,467	906	-2,561	
7/18	2,359	1,168	-1,191	
7/19	789	333	-456	
7/20	934	426	-508	
7/21	473	349	-124	
7/22	642	291	-351	
7/23	1,110	485	-625	
7/24	1,873	700	-1,173	
7/25	3,949	1,880	-2,069	
7/26	4,651	1,349	-3,302	
7/27	4,472	1,911	-2,561	
7/28	3,702	1,013	-2,689	
7/29	2,209	730	-1,479	
7/30	5,233	1,081	-4,152	
7/31	4,424	1,001	-3,423	
8/1	7,063	764	-6,299	
8/2	9,900	1,045	-8,855	
8/3	8,983	873	-8,110	
8/4	9,507	973	-8,534	
8/5	7,528	926	-6,602	
8/6	9,287	938	-8,349	
8/7	19,094	1,571	-17,523	
8/8	34,821	1,709	-33,112	
8/9	27,428	1,533	-25,895	
8/10	6,558	383	-6,175	
8/11	13,571	1,067	-12,504	
8/12	12,560	839	-11,721	
8/13	13,277	1,515	-11,762	
8/14	8,772	1,378	-7,394	
8/15	4,484	1,060	-3,424	
Total	367,465	47,905	-319,560	-87.0%

Appendix C4.—DIDSON right bank nearshore stratum daily hourly salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Hour	Date																Total		
	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	
0100	363	508	496	1,258	684	617	163	2,765	1,246	478	557	920	42	2,844	2,227	1,047	369	454	17,038
0200	145	242	48	2,118	502	230	24	1,332	702	641	902	218	42	2,384	2,910	986	496	175	14,098
0300	169	212	175	1,458	369	115	12	395	230	248	218	115	18	2,051	2,202	962	272	103	9,326
0400	212	133	24	787	73	36	61	359	188	109	206	121	30	1,537	2,160	920	91	218	7,262
0500	61	54	30	629	48	0	-12	316	91	127	139	399	12	1,700	1,640	1,095	417	248	6,996
0600	54	121	42	545	48	0	0	189	182	61	127	266	48	3,062	992	1,234	254	490	7,715
0700	42	67	48	666	61	67	-6	310	327	200	424	508	0	1,664	2,832	363	357	230	8,158
0800	272	97	121	502	36	73	24	268	266	321	472	290	0	1,609	1,628	914	18	375	7,286
0900	581	224	103	551	36	163	24	268	85	145	375	272	36	678	1,966	139	375	0	6,022
1000	333	67	133	212	236	139	30	182	206	54	36	157	61	538	502	218	97	151	3,352
1100	290	42	12	829	188	315	218	284	127	157	139	103	563	375	169	61	79	3,951	
1200	200	73	48	551	48	914	557	873	478	381	206	188	151	472	151	345	109	248	5,991
1300	212	163	194	738	290	508	36	1,343	1,972	817	145	260	502	1,694	472	526	91	339	10,304
1400	532	0	194	768	212	369	284	619	363	696	296	110	690	520	653	224	12	369	6,913
1500	127	48	315	254	79	236	24	1,224	157	430	61	254	659	623	998	296	85	200	6,071
1600	369	79	1,119	563	321	393	121	895	484	260	478	363	1,507	1,755	2,577	950	151	417	12,803
1700	248	30	1,416	375	411	248	475	859	670	684	200	188	2,202	2,620	4,744	1,234	611	617	17,832
1800	381	91	847	333	424	321	407	1,153	692	678	812	151	1,912	2,154	3,782	1,095	538	895	16,666
1900	194	36	1,482	593	702	508	401	793	711	781	696	12	1,476	569	3,745	42	175	393	13,310
2000	593	133	944	303	623	581	158	696	385	629	411	212	781	490	2,281	278	230	1,265	10,992
2100	442	151	496	781	581	514	1,438	224	122	557	115	6	1,041	1,156	599	1,041	200	1,131	10,593
2200	472	399	1,839	647	417	696	274	284	799	333	212	145	2,602	1,561	345	726	563	793	13,107
2300	436	472	1,991	835	744	309	821	538	496	605	345	-12	1,319	1,597	1,452	157	85	647	12,837
2400	466	847	1,809	587	817	175	707	865	363	532	569	67	1,815	2,868	781	623	169	327	14,387

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Hour	Date															Total	
	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	
0100	738	635	926	605	339	266	103	85	30	557	73	12	91	6	0	218	1,059
0200	690	647	1,277	738	212	212	121	42	30	248	24	103	6	97	30	67	490
0300	212	581	1,283	424	260	206	67		67	54	42	79	24	24	30	61	254
0400	206	266	587	599	230	127	18		73	42	48	12	18	36	12	24	260
0500	557	254	563	575	296	85	115		109	127	30	12	18	0	36	24	133
0600	726	333	581	327	490	424	151		224	163	127	73	0	-6	30	30	387
0700	587	587	478	526	369	200	151		278	393	121	30	61	30	42	260	369
0800	599	417	460	532	182	-18	266		-6	442	91	85	163	103	79	175	538
0900	1,150	484	430	290	139	224	230		188	254	85	36	296	163	54	411	950
1000	0	569	732	151	73	381	284	42	175	218	115	103	218	61	151	430	902
1100	169	48	847	218	200	121	223	6	357	6	67	24	6	327	121	175	405
1200	296	369	85	424	387	206	18	109	151	139	24	0	12	12	6	91	1,035
1300	496	690	1,487	460	175	424	387	115	296	48	-12	24	0	24	133	363	1,198
1400	938	260	395	375	73	42	363	109	236	85	0	6	0	30	18	91	1,174
1500	496	206	929	248	42	248	6	254	266	18	12	0	0	0	24	85	448
1600	351	635	1,688	949	206	48	375	557	889	0	97	91	-6	42	0	575	357
1700	417	629	1,190	1,029	157	61	139	508	1,059	169	6	6	6	18	6	127	266
1800	375	865	466	387	133	218	30	514	835	170	42	6	-6	133	73	327	146
1900	363	442	859	163	61	266	61	182	599	169	54	103	48	73	79	576	133
2000	920	97	1,029	605	315	54	242	30	678	91	48	12	61	30	352	327	290
2100	1,131	768	611	714	284	182	42	206	290	103	12	145	36	0	61	569	605
2200	986	805	1,186	793	242	388	109	254	296	91	0	103	97	0	333	224	391
2300	974	1,137	659	339	218	224	91	242	290	133	6	73	115	24	48	260	230
2400	1,269	1,190	502	175	200	260	42	54	309	133	103	133	12	212	296	871	431

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Hour	Date															Total			
	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	
0100	255	73	659	284	980	1,513	793	998	375	1,464	666	774	484	3,098	224	212	321	13,172	
0200	103	363	333	163	762	992	1,071	1,404	424	793	430	496	387	1,930	1,349	30	641	11,672	
0300	48	321	236	218	345	641	659	1,240	617	545	254	532	121	1,095	871	914	1,736	10,395	
0400	42	121	163	309	260	932	1,809	1,597	2,426	472	97	248	272	1,119	1,228	811	1,730	13,638	
0500	73	79	139	109	841	508	1,670	3,564	1,809	1,531	79	278	363	569	284	587	2,517	14,999	
0600	158	121	91	115	1,137	581	2,493	5,161	4,641	2,565	357	133	926	889	399	242	2,142	22,151	
0700	261	696	538	97	339	532	4,998	5,336	4,798	3,654	1,289	998	2,541	2,142	1,422	54	532	30,229	
0800	134	908	641	309	151	363	139	7,642	6,649	3,170	3,285	2,571	2,916	732	2,287	121	454	32,473	
0900	164	1,053	726	690	345	48	67	12	635	5,718	3,455	3,842	5,016	1,718	599	1,077	309	25,473	
1000	1,131	678	1,047	932	538	599	97	61	36	260	5,161	3,068	3,679	3,261	998	357	841	424	23,167
1100	817	484	774	103	832	321	139	296	254	0	484	756	2,087	4,138	1,537	224	399	381	14,028
1200	938	436	1,174	417	582	696	1,135	1,180	835	163	73	1,591	6,323	5,052	641	206	520	21,962	
1300	702	982	926	1,331	829	442	1,452	908	1,597	1,476	30	2,614	2,033	3,062	2,692	1,585	883	611	24,155
1400	3,600	2,142	1,053	1,410	1,531	375	284	163	1,531	2,039	1,386	193	3,074	4,998	3,993	871	375	417	29,435
1500	2,698	1,162	339	1,882	2,335	1,343	260	163	2,630	1,004	1,724	762	2,154	3,709	1,150	424	296	103	24,140
1600	1,301	714	351	974	2,093	2,884	1,234	242	2,414	1,162	2,172	1,361	2,850	520	2,257	708	103	1,029	24,369
1700	1,053	224	799	1,035	1,628	2,264	2,747	2,565	1,531	1,615	1,833	1,216	2,995	1,228	1,694	581	1,168	793	26,968
1800	599	532	182	387	2,075	1,331	4,756	2,475	5,706	1,565	1,131	526	133	1,470	575	617	2,850	393	27,304
1900	466	296	103	411	1,676	889	2,027	672	4,689	2,136	1,918	133	1,352	121	532	799	738	284	19,243
2000	290	218	218	526		1,827	4,998	4,405	7,841	2,505	5,760	3,189	5,439	1,386	321	1,156	2,118	194	42,389
2100	2,045	490	363	442	920	2,233	6,353	2,239	6,069	3,697	4,229	3,455	6,359	781	42	194	2,904	182	42,994
2200	2,692	254	557	508	454	1,210	1,549	4,429	5,288	2,227	2,856	4,272	720	998	1,434	351	1,392	212	31,402
2300	653	484	726	835	998	1,228	2,323	1,494	7,684	1,876	2,711	1,948	7,025	393	1,525	2,614	61	309	34,887
2400	545	659	575	1,204	1,573	1,991	3,062	1,083	2,366	1,349	2,668	1,174	4,308	2,922	218	944	67	103	26,809

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Appendix C4.—Page 4 of 4.

Hour	Date			Total
	8/13	8/14	8/15	
0100	67	212	163	442
0200	284	248	321	853
0300	351	502	175	1,029
0400	756	599	399	1,755
0500	684	762	454	1,900
0600	182	950	345	1,476
0700	1,646	1,646	920	4,211
0800	42	2,850	1,458	4,350
0900	24	805	2,432	3,261
1000	321	2,160	236	2,717
1100	133	442	6	581
1200	103	109	24	236
1300	272	6	36	315
1400	599	18	12	629
1500	853	248		1,101
1600	2,565	200		2,765
1700	351	121		472
1800	290	61		351
1900	720	12		732
2000	629	30		659
2100	932	73		1,004
2200	557	157		714
2300	666	236		902
2400	254	424		678

Appendix C5.—Bendix right bank nearshore stratum daily hourly salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Hour	Date																Total		
	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	
0100	252	1,172	556	4,060	1,372	680	80	3,464	1,538	953	1,265	1,066	140	3,685	2,839	1,093	517	284	25,016
0200	215	892	239	6,526	1,223	340	62	2,225	1,763	671	1,728	513	49	4,234	3,844	1,407	542	219	26,692
0300	203	1,071	202	4,455	1,161	297	157	1,601	1,558	583	901	469	69	3,098	3,644	1,532	617	245	21,863
0400	269	609	139	3,243	440	97	135	1,274	801	366	632	308	87	2,157	2,848	1,871	276	215	15,767
0500	136	255	75	2,357	202	66	11	851	610	155	566	754	100	554	1,887	2,128	464	293	11,464
0600	268	210	100	1,541	206	60	18	473	837	339	1,573	1,292	105	1,992	371	586	262	305	10,538
0700	216	271	90	1,629	192	154	36	648	863	686	2,112	1,256	111	3,337	1,861	127	113	377	14,079
0800	209	244	153	1,221	138	277	35	634	863	486	1,334	719	188	2,371	2,716	489	128	160	12,365
0900	1,133	719	324	1,440	212	149	54	367	519	286	705	584	142	1,347	2,166	401	113	88	10,749
1000	403	181	280	1,855	342	217	90	454	325	216	280	248	157	837	1,267	378	181	223	7,934
1100	250	102	73	773	342	1,064	270		335	214	849	143	744	588	405	402	184	259	6,997
1200	447	272	173	614	260	1,529	490	1,626	1,480	215	1,022	480	1,051	1,348	566	441	377	397	12,788
1300	518	347	492	2,132	700	584	225	2,706	2,119	215	1,290	346	538	1,492	692	384	148	434	15,362
1400	641	144	557	856	708	509	195	1,106	1,255	215	241	279	423	783	1,176	215	159	431	9,893
1500	318	146	587	917	350	269	84	746	582	35	421	284	1,154	1,384	1,165	652	181	296	9,571
1600	742	196	1,920	887	493	393	223	1,009	849	18	773	418	1,925	1,669	3,496	1,247	238	532	17,028
1700	328	142	1,849	650	472	365	527	1,319	1,154	62	743	364	1,841	2,514	5,221	985	468	752	19,756
1800	278	213	1,165	825	639	555	705	1,354	1,227	672	1,235	218	1,764	816	4,492	864	514	762	18,298
1900	553	162	1,442	785	805	309	433	576	593	678	1,313	79	1,623	983	1,989	631	362	430	13,746
2000	859	286	1,606	814	1,057	579	369	789	398	633	581	74	1,233	724	1,617	684	151	533	12,987
2100	932	211	1,172	779	576	545	493	700	444	790	385	73	2,766	1,283	971	620	379	1,193	14,312
2200	618	646	2,673	992	747	643	800	588	706	841	398	141	2,633	2,212	816	780	376	1,196	17,806
2300	885	644	3,691	1,289	723	410	729	1,127	633	800	842	48	2,335	2,012	1,752	487	177	644	19,228
2400	1,192	1,215	2,414	966	1,149	269	1,316	1,216	642	1,393	669	76	2,653	2,802	1,001	709	161	813	20,656

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Appendix C5.—Page 2 of 4.

Hour	Date															Total		
	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24		
0100	693	1,054	828	601	192	148	79	28	37	96	42	43	15	39	32	62	425	4,414
0200	501	1,077	1,970	941	296	123	81	41	71	96	35	29	33	48	41	35	88	5,506
0300	288	1,092	1,601	942	425	111	66		45	47	35	23	12	22	22	9	131	4,871
0400	451	739	944	879	450	222	122		60	28	45	10	22	21	21	13	52	4,079
0500	626	633	846	721	543	389	169		80	50	37	33	34	33	22	13	116	4,345
0600	951	676	737	832	603	376	324		83	85	55	36	40	17	33	39	176	5,063
0700	897	936	938	1,206	418	141	344		39	142	28	20	37	29	39	50	204	5,468
0800	753	821	856	779	409	109	137		45	66	32	52	34	36	32	62	260	4,483
0900	102	566	1,065	369	346	145	87		185	122	12	16	62	40	75	41	382	3,615
1000	117	71	456	520	173	167	31	86	97	96	64	49	19	25	77	130	618	2,796
1100	937	125	76	322	206	94	48	46	178	40	10	19	31	44	59	77	389	2,701
1200	1,005	1,898	696	121	215	148	58	53	162	52	6	39	23	35	58	123	742	5,434
1300	1,067	1,382	1,704	346	66	152	67	72	222	29	31	34	5	14	64	89	1,422	6,766
1400	786	631	729	224	214	159	88	102	163	26	25	16	17	50	14	50	1,007	4,301
1500	807	414	918	480	115	136	100	150	280	14	44	11	19	63	7	145	136	3,839
1600	692	1,221	1,971	1,068	228	89	110	256	336	42	60	57	17	53	12	171	370	6,753
1700	666	981	1,065	818	129	138	120	234	382	36	48	24	28	35	35	59	201	4,999
1800	819	654	682	260	62	121	74	176	327	26	12	58	39	65	44	106	140	3,665
1900	754	532	600	191	75	82	65	119	239	18	21	48	33	26	53	95	129	3,080
2000	825	485	929	276	119	34	54	103	347	42	19	30	26	27	116	215	365	4,012
2100	1,061	834	1,086	651	157	163	49	84	194	13	20	24	33	28	31	252	497	5,177
2200	2,213	816	921	551	106	184	46	370	140	36	17	19	40	5	24	205	115	5,808
2300	1,990	697	424	363	165	177	78	118	136	12	13	26	43	42	53	317	261	4,915
2400	1,678	901	449	216	180	148	48	78	150	26	34	49	90	37	81	346	85	4,596

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Hour	Date															Total			
	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	
0100	60	226	114	138	588	1,154	614	338	211	347	115	54	103	466	326	82	104	5,040	
0200	44	231	101	201	540	830	732	583	180	271	133	80	44	245	237	191	501	5,144	
0300	21	145	216	316	413	617	866	651	552	81	67	139	32	260	131	331	1,111	5,949	
0400	10	70	197	196	487	644	1,065	580	892	248	88	46	100	271	162	126	964	6,146	
0500	52	34	133	111	606	253	1,123	1,066	782	380	70	81	124	135	155	99	419	5,623	
0600	15	177	238	132	666	333	3,555	3,154	3,010	1,155	58	60	371	494	156	48	612	14,234	
0700	33	515	403	320	555	1,630	1,748	4,261	3,418	2,423	261	460	1,321	565	304	37	115	18,369	
0800	30	513	789	633	1,025	1,014	46	638	3,191	2,347	356	841	1,728	405	155	304	200	14,215	
0900	57	501	662	761	1,850	468	556	76	17	2,417	593	2,609	3,825	853	107	368	120	15,840	
1000	542	621	457	570	1,643	470	491	164	145	25	620	1,469	1,429	1,162	898	66	142	186	11,100
1100	471	304	724	182	667	605	751	390	550	250	226	235	3,354	797	1,220	347	222	123	11,418
1200	618	479	634	781	531	486	1,303	506	1,239	207	1,377	564	4,647	742	331	360	472	15,277	
1300	1,206	754	976	1,276	795	237	550	436	1,227	1,454	968	602	3,544	2,457	450	163	158	672	17,925
1400	1,959	1,212	691	1,412	1,318	617	377	53	1,264	702	1,050	91	1,706	2,464	281	185	540	129	16,051
1500	2,175	1,004	638	1,259	2,142	1,377	619	30	1,499	772	1,915	253	1,914	1,706	669	207	255	80	18,514
1600	1,151	377	449	1,241	1,698	1,770	1,874	460	1,171	785	1,253	215	3,109	335	1,364	118	135	187	17,692
1700	719	411	212	922	2,549	1,370	2,816	1,864	1,924	1,017	925	115	2,089	639	240	114	118	109	18,153
1800	673	377	213	665	1,834	1,162	3,590	2,952	4,416	649	959	48	403	623	112	144	909	53	19,782
1900	198	304	283	472	1,073	1,579	3,241	2,032	4,565	1,424	3,030	534	2,478	105	141	110	877	18	22,464
2000	456	237	236	459		1,749	6,845	2,634	4,153	906	4,122	2,667	4,327	246	41	292	514	9	29,893
2100	1,536	283	402	313	740	1,503	4,224	2,476	2,581	1,095	1,759	3,641	2,653	243	208	18	400	42	24,117
2200	986	144	514	719	977	836	2,158	1,780	4,359	621	593	1,977	1,225	142	776	559	129	13	18,508
2300	399	192	602	885	1,326	1,085	1,840	1,306	3,003	951	520	694	1,593	366	604	913	7	5	16,291
2400	434	358	436	898	1,607	1,085	1,385	571	1,024	251	210	425	1,653	1,061	444	337	30	21	12,230

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Hour	Date			Total
	8/13	8/14	8/15	
0100	34	89	106	229
0200	75	230	114	419
0300	165	509	135	809
0400	308	563	400	1,271
0500	73	605	240	918
0600	86	194	80	360
0700	244	1,480	127	1,851
0800	43	2,420	1,854	4,317
0900	113	931	979	2,023
1000	196	1,498	57	1,751
1100	50	145	28	223
1200	38	12	11	61
1300	80	8	1	89
1400	343	15	10	368
1500	826	7		833
1600	123	26		149
1700	40	2		42
1800	276	15		291
1900	71	4		75
2000	152	8		160
2100	207	9		216
2200	132	6		138
2300	61	14		75
2400	38	42		80

Appendix C6.—DIDSON right bank offshore stratum daily hourly salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Hour	Date															Total			
	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	
0100	66	78	115	808	416	253	78	515	163	181	247	247	36	428	434	193	66	109	4,435
0200	90	73	30	603	205	114	36	297	133	96	235	175	60	283	368	127	42	115	3,082
0300	109	121	60	410	97	90	42	199	66	30	109	156	66	163	410	265	73	60	2,528
0400	78	66	18	187	30	60	42	157	60	84	78	163	36	211	248	133	79	36	1,768
0500	109	12	18	223	90	72	24	194	78	114	174	169	54	259	157	72	79	36	1,935
0600	91	72	0	223	72	66	30	218	84	156	181	187	36	271	356	157	48	24	2,274
0700	60	54	42	217	54	54	84	248	144	133	84	133	48	392	379	169	78	54	2,429
0800	54	109	78	205	42	72	60	139	72	60	133	115	24	271	211	205	60	72	1,984
0900	78	54	72	368	240	162	18	60	90	115	121	72	24	139	320	186	24	36	2,181
1000	90	24	42	265	313	319	54	320	102	156	181	60	42	217	452	109	6	72	2,825
1100	103	72	24	524	133	199	48	235	241	211	247	54	54	175	223	84	72	103	2,802
1200	114	48	85	350	187	701	235	358	247	230	151	90	60	205	127	60	36	36	3,319
1300	85	79	235	483	211	115	235	242	537	374	320	66	84	121	157	42	66	133	3,582
1400	79	66	415	442	409	187	96	393	361	253	313	139	85	109	229	78	12	126	3,792
1500	96	78	723	115	150	151	144	386	788	362	289	169	133	361	139	163	42	157	4,447
1600	181	24	621	477	362	584	217	565	260	313	343	97	247	150	78	114	127	91	4,851
1700	277	72	1,242	458	446	332	115	392	284	392	398	108	488	337	72	139	139	84	5,774
1800	247	169	1,205	572	524	289	333	511	442	1,145	362	132	483	808	296	175	127	218	8,036
1900	181	60	2,393	916	374	349	428	327	272	578	368	114	512	664	379	127	139	277	8,459
2000	223	133	1,997	857	416	397	333	507	412	572	289	78	404	620	283	151	97	307	8,076
2100	187	91	531	754	337	493	877	355	381	524	175	102	199	374	259	102	175	193	6,109
2200	235	151	1,079	326	295	157	441	374	337	368	192	103	278	235	157	133	193	247	5,300
2300	109	127	1,279	392	331	247	436	181	331	271	120	96	175	416	181	157	102	518	5,470
2400	133	139	918	440	241	174	374	314	241	290	114	48	217	337	115	103	151	181	4,529

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Appendix C6.–Page 2 of 4.

Hour	Date															Total		
	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24		
0100	302	398	338	284	295	54	24	12	49	42	18	6	12	0	30	0	36	1,900
0200	48	247	374	362	96	96	127	24	67	109	61	36	30	36	55	42	243	2,054
0300	114	265	326	398	133	121	84		79	103	67	12	6	36	48	18	303	2,115
0400	90	205	284	369	139	48	241		49	61	42	24	42	18	24	18	346	2,001
0500	169	103	223	229	163	90	97		97	49	18	30	6	24	36	30	188	1,552
0600	103	91	109	157	97	78	79		85	109	30	30	6	30	6	24	170	1,203
0700	109	103	230	78	78	103	66		91	-12	43	36	18	6	18	91	85	1,142
0800	127	157	272	157	103	54	79		249	103	36	18	-12	6	0	133	152	1,633
0900	715	344	265	90	54	54	42	67	115	18	97	176	-6	85	18	139	163	2,438
1000	235	242	199	145	24	103	73	18	115	67	12	194	12	24	42	18	36	1,560
1100	265	319	994	223	97	133	187	79	188	30	36	-6	6	36	49	6	218	2,860
1200	307	573	620	319	127	278	502	127	188	30	12	18	42	73	12	200	103	3,533
1300	217	488	735	181	477	150	272	36	109	127	-6	6	0	12	42	127	461	3,437
1400	332	350	151	205	120	42	236	85	97	18	24	67	6	0	18	24	109	1,885
1500	96	163	381	108	108	139	72	79	48	133	30	60	24	18	0	73	91	1,625
1600	67	319	236	182	193	61	235	66	91	273	24	43	12	18	36	145	79	2,081
1700	90	338	241	242	24	375	181	115	369	97	48	36	61	24	-6	128	30	2,394
1800	223	162	435	139	109	121	296	248	412	303	109	37	30	97	290	115	72	3,200
1900	193	447	428	157	54	48	-6	73	254	163	-6	36	24	18	49	115	73	2,122
2000	187	108	145	290	48	60	79	12	200	163	18	12	24	18	194	103	485	2,147
2100	175	187	248	314	91	151	60	61	139	97	42	42	30	6	18	67	115	1,844
2200	482	229	489	163	54	66	48	133	30	67	12	12	36	30	61	121	201	2,237
2300	266	138	145	36	36	42	42	6	133	182	12	6	24	18	24	91	79	1,281
2400	289	212	319	151	48	6	169	36	212	24	6	0	37	6	43	43	109	1,711

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Hour	Date															Total			
	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	
0100	85	182	176	121	243	85	327	425	570	364	206	455	2,034	1,262	346	194	358	7,434	
0200	116	158	200	97	303	449	352	722	255	425	765	874	971	2,662	1,778	261	340	10,727	
0300	67	334	358	109	412	170	315	801	644	376	370	1,074	825	2,221	3,013	522	715	12,326	
0400	55	194	339	206	388	388	516	1,898	1,765	540	200	601	1,318	2,602	1,929	1,676	1,056	15,672	
0500	85	194	109	206	826	316	558	1,479	1,345	903	255	474	1,018	1,366	564	2,929	1,996	14,624	
0600	97	395	152	170	1,472	632	449	630	564	781	424	461	1,237	547	437	564	805	9,816	
0700	335	546	267	116	315	776	589	194	139	55	309	115	170	218	346	67	97	4,654	
0800	152	365	67	109	97	121	218	474	170	915	242	97	316	115	776	231	248	4,713	
0900	358	152	224	79	115	24	200	73	224	285	242	552	164	188	85	309	224	3,498	
1000	285	182	115	36	43	24	103	49	24	508	1,438	521	352	1,192	735	91	79	267	6,043
1100	286	182	134	97	79	121	322	152	353	-6	569	127	940	691	146	462	133	79	4,865
1200	133	163	128	24	85	103	346	182	303	250	405	284	805	2,330	468	473	486	280	7,248
1300	115	194	91	55	115	103	91	647	158	1,055	55	236	2,866	2,700	2,727	697	182	1,714	13,799
1400	340	430	79	67	42	109	121	187	79	97	127	272	947	3,263	599	684	328	472	8,245
1500	189	182	650	103	103	97	122	79	36	79	91	363	0	2,743	2,532	612	527	418	8,926
1600	236	61	115	188	115	109	176	328	42	316	73	73	115	527	2,077	1,164	73	448	6,236
1700	255	61	91	103	79	334	24	921	42	284	225	406	370	867	2,672	455	831	884	8,904
1800	147	121	30	49	49	182	478	97	127	152	188	121	36	1,296	2,528	369	1,001	151	7,124
1900	146	67	61	48	115	91	249	18	443	726	170	145	115	152	787	363	805	254	4,755
2000	116	91	48	73	18	115	231	103	176	109	157	526	278	558	230	515	1,102	576	5,023
2100	55	30	43	18	43	18	698	36	559	358	534	61	73	2,231	612	55	424	521	6,368
2200	249	36	49	6	79	24	152	6	346	619	217	42	285	1,613	696	242	617	248	5,527
2300	461	73	67	36	49	30	133	73	267	175	103	587	2,827	2,579	933	188	97	327	9,007
2400	291	79	109	91	48	0	292	327	352	140	164	819	1,031	899	413	188	134	79	5,455

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Hour	Date			Total
	8/13	8/14	8/15	
0100	109	194	170	474
0200	273	255	152	679
0300	315	243	140	697
0400	867	413	449	1,728
0500	1,353	315	455	2,124
0600	2,967	1,542	898	5,408
0700	418	1,035	1,280	2,733
0800	152	97	279	528
0900	176	383	61	620
1000	740	686	316	1,741
1100	206	395	61	662
1200	158	533	152	843
1300	152	67	30	249
1400	418	389	42	849
1500	751	358		1,109
1600	587	497		1,084
1700	321	200		521
1800	158	109		267
1900	327	109		436
2000	839	67		905
2100	521	139		661
2200	655	225		879
2300	625	286		911
2400	188	237		425

Appendix C7.—Bendix right bank offshore stratum daily hourly salmon counts, Nushagak River sonar project, 17 June–15 August, 2004.

Hour	Date																Total		
	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	
0100	8	48	14	107	24	7	6	19	22	3	51	53	23	76	89	78	10	15	653
0200	13	13	1	69	8	8	1	18	1	3	69	26	7	71	148	76	24	13	569
0300	9	3	6	118	6	2	7	17	4	2	39	16	15	114	181	82	11	19	651
0400	4	33	0	331	6	3	7	79	4	1	20	30	7	71	131	77	13	16	833
0500	3	72	0	146	3	8	0	37	8	1	28	20	25	81	76	46	18	21	593
0600	3	4	9	79	16	7	2	9	6	2	24	33	5	86	65	53	18	8	429
0700	4	9	5	42	0	12	2	5	6	2	28	11	11	141	137	37	31	34	517
0800	9	19	2	44	5	5	5	12	14	2	30	13	11	108	101	54	21	14	469
0900	3	37	33	134	12	1	1	9	18	1	25	7	7	46	63	58	1	12	468
1000	8	6	20	32	19	30	5	19	1	1	20	13	2	35	55	24	2	9	301
1100	8	17	0	36	8	8	26	37	2	42	20	8	11	25	36	38	7	23	352
1200	10	1	15	18	4	8	2	43	29	41	16	10	12	41	20	33	13	13	329
1300	3	8	21	37	12	4	3	9	33	32	31	14	15	19	21	11	19	19	311
1400	2	1	52	5	4	2	0	19	16	55	17	14	17	12	37	15	8	10	286
1500	3	16	23	25	4	5	0	20	9	56	41	11	13	27	23	26	1	22	325
1600	9	13	72	6	6	2	32	18	4	43	43	18	22	26	28	13	25	22	402
1700	19	2	78	7	5	6	45	21	2	91	53	23	33	16	32	27	16	20	496
1800	12	9	77	11	13	5	26	28	2	101	37	21	43	54	57	45	16	19	576
1900	9	2	101	20	16	8	5	10	3	63	42	13	48	29	88	22	14	46	539
2000	12	6	60	9	9	3	6	17	6	44	32	16	47	40	69	17	15	24	432
2100	18	7	38	5	4	7	10	18	1	52	12	7	50	40	53	34	26	30	412
2200	13	16	77	10	7	2	4	17	2	42	17	14	49	30	27	30	25	30	412
2300	23	14	150	10	16	6	11	12	2	42	18	11	58	65	32	31	41	56	598
2400	16	15	104	20	11	7	12	6	0	40	11	9	78	56	45	45	27	46	548

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Hour	Date															Total	
	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	
0100	71	70	78	56	23	4	6	15	10	82	14	12	29	6	34	41	116
0200	29	97	116	100	27	6	12	15	28	107	28	22	47	11	23	41	155
0300	61	182	132	103	30	15	4		66	122	21	28	16	20	18	28	258
0400	31	148	120	93	26	17	21		42	103	11	11	30	10	20	32	302
0500	38	60	106	78	32	16	10		72	208	25	3	24	2	30	27	191
0600	25	87	44	33	35	20	14		25	69	40	9	41	5	21	18	591
0700	22	43	89	42	29	23	17		14	27	27	22	16	14	10	20	442
0800	40	70	55	38	31	2	4		36	14	24	19	22	17	30	22	453
0900	25	88	79	20	23	5	6	20	23	25	6	12	14	11	23	14	423
1000	64	3	41	32	14	14	5	18	5	20	9	39	3	12	13	19	24
1100	53	35	23	25	11	9	12	12	23	16	6	11	7	7	42	44	370
1200	97	122	106	26	13	15	15	40	20	26	9	10	16	24	20	35	633
1300	58	109	98	35	14	7	16	11	30	15	12	15	16	9	14	11	506
1400	70	37	32	17	3	6	32	13	19	35	5	20	6	11	21	11	58
1500	29	35	17	18	3	21	23	10	36	58	16	25	0	11	11	33	384
1600	49	49	18	27	6	11	8	49	27	56	14	39	1	21	12	19	436
1700	30	63	26	21	10	9	6	71	66	13	6	22	9	8	12	31	428
1800	53	28	31	20	7	10	6	23	82	21	12	19	10	18	14	23	411
1900	29	41	34	5	3	8	2	14	39	37	7	6	2	6	33	26	312
2000	10	16	30	8	1	9	3	18	44	22	12	12	5	26	6	57	71
2100	68	17	24	12	3	19	2	22	30	16	4	5	0	13	11	41	343
2200	56	38	47	4	8	2	1	13	36	22	12	28	8	5	25	32	61
2300	76	47	29	3	12	12	6	35	45	36	5	24	21	8	20	23	51
2400	60	53	29	10	8	4	6	23	88	18	8	13	6	16	22	52	453
																	507

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Hour	Date															Total			
	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	
0100	61	72	41	56	50	38	39	99	38	102	44	84	197	187	98	38	35	1,279	
0200	53	121	89	83	125	123	65	143	44	154	78	204	184	307	206	79	51	2,109	
0300	76	143	95	85	126	105	41	132	114	45	45	138	142	198	234	91	81	1,891	
0400	90	300	202	62	111	147	133	171	85	98	42	115	144	234	150	186	93	2,363	
0500	101	549	115	82	217	131	121	137	104	165	43	84	165	144	66	157	123	2,504	
0600	172	167	86	38	126	154	37	43	22	91	61	33	117	45	30	34	35	1,291	
0700	82	67	30	34	88	79	33	23	12	16	63	18	20	24	59	14	11	673	
0800	75	47	24	50	9	25	7	57	30	20	34	20	9	11	29	26	28	501	
0900	73	39	23	22	21	13	19	3	9	26	31	8	23	23	23	14	37	407	
1000	93	43	18	15	24	8	6	9	8	16	77	31	39	33	37	21	13	9	500
1100	60	29	12	28	31	16	18	32	12	10	25	39	19	41	44	29	19	6	470
1200	69	9	20	13	18	9	25	29	23	10	38	9	163	86	45	66	43	30	705
1300	28	44	25	6	13	13	11	23	5	28	42	19	135	38	69	38	40	76	653
1400	20	33	21	34	21	17	11	10	14	6	39	1	9	40	42	19	42	43	422
1500	23	32	31	23	8	18	5	9	16	14	14	4	3	13	46	29	22	34	344
1600	31	26	34	36	13	13	15	10	6	7	2	9	6	8	60	22	7	29	334
1700	22	13	15	10	18	8	19	10	13	9	10	14	32	52	54	20	38	21	378
1800	27	26	17	11	15	22	14	16	34	13	14	14	9	36	61	54	72	8	463
1900	20	26	23	7	15	19	52	19	20	33	13	2	7	19	50	19	49	15	408
2000	21	19	16	4	5	3	6	22	42	5	11	14	36	19	23	21	31	21	319
2100	18	11	22	7	5	2	26	7	120	27	58	0	10	41	14	6	18	19	411
2200	26	33	6	10	7	6	14	8	44	47	31	18	12	35	18	3	11	8	337
2300	51	17	16	4	5	4	18	16	35	19	64	21	38	48	19	15	5	11	406
2400	57	45	32	10	10	28	29	17	23	12	47	39	52	27	56	21	18	15	538

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Hour	Date			Total
	8/13	8/14	8/15	
0100	34	54	40	128
0200	45	53	92	190
0300	38	79	77	194
0400	72	256	130	458
0500	117	202	196	515
0600	290	140	199	629
0700	30	27	121	178
0800	16	30	39	85
0900	45	34	55	134
1000	51	86	46	183
1100	21	28	14	63
1200	18	43	22	83
1300	25	13	16	54
1400	61	59	13	133
1500	133	38		171
1600	80	39		119
1700	91	30		121
1800	47	23		70
1900	35	9		44
2000	86	9		95
2100	40	23		63
2200	65	20		85
2300	55	44		99
2400	20	39		59

Appendix C8.—DIDSON and Bendix total escapement estimates for the right bank by species, Nushagak River sonar project, 17 June–15 August, 2004.

Total	Didson	Bendix	Difference	Percent Deviation
Escapement	1,344,193	900,209	-443,984	-33.0%
Total Var	1,186,144,179	343,556,467		
SE	34,440	18,535		
CV	0.0256	0.0206		
90% CI	56,482	30,398		
Lower	1,251,562	850,357		
Upper	1,436,824	950,061		
Sockeye				
Escapement	266,801	296,436	29,635	11.1%
Total Var	364,364,820	92,287,507		
SE	19,088	9,607		
CV	0.0715	0.0324		
90% CI	31,305	15,755		
Lower	215,461	270,598		
Upper	318,141	322,274		
Chinook				
Escapement	71,276	35,763	-35,513	-49.8%
Total Var	30,169,118	29,083,600		
SE	5,493	5,393		
CV	0.0771	0.1508		
90% CI	9,008	8,844		
Lower	56,503	21,258		
Upper	86,049	50,268		
Chum				
Escapement	194,970	178,747	-16,222	-8.3%
Total Var	154,495,185	117,004,172		
SE	12,430	10,817		
CV	0.0638	0.0605		
90% CI	20,385	17,740		
Lower	161,539	149,654		
Upper	228,400	207,840		
Coho				
Escapement	146,997	61,647	-85,350	-58.1%
Total Var	211,506,148	43,170,826		
SE	14,543	6,570		
CV	0.0989	0.1066		
90% CI	23,851	10,776		
Lower	107,881	43,975		
Upper	186,112	79,319		
Pink				
Escapement	664,150	327,616	-336,534	-50.7%
Total Var	425,608,907	62,010,361		
SE	20,630	7,875		
CV	0.0311	0.0240		
90% CI	33,834	12,914		
Lower	608,663	306,436		
Upper	719,637	348,795		

Appendix C9.—DIDSON and Bendix escapement estimates for the right bank inshore stratum and offshore stratum by species, Nushagak River sonar project, 17 June–15 August, 2004.

Strata Total	Didson IS	Bendix IS	Difference	Percent Deviation	Didson OS	Bendix OS	Difference	Percent Deviation
Escapement	976,728	852,304	-124,424	-12.7%	367,465	47,905	-319,560	-87.0%
Total Var	939,300,501	340,886,882			246,843,678	2,669,585		
SE	30,648	18,463			15,711	1,634		
CV	0.0314	0.0217			0.0428	0.0341		
90% CI	50,263	30,280			25,766	2,680		
Lower	894,297	802,646			325,208	43,510		
Upper	1,059,159	901,962			409,722	52,300		
Sockeye								
Escapement	227,775	290,066	62,291	27.3%	39,025	6,369	-32,656	-83.7%
Total Var	330,091,832	92,022,009			34,272,988	265,498		
SE	18,168	9,593			5,854	515		
CV	0.0798	0.0331			0.1500	0.0809		
90% CI	29,796	15,732			9,601	845		
Lower	178,910	264,266			23,280	4,984		
Upper	276,641	315,867			54,771	7,755		
Chinook								
Escapement	17,947	28,280	10,334	57.6%	53,329	7,483	-45,847	-86.0%
Total Var	11,643,021	28,749,714			18,526,097	333,886		
SE	3,412	5,362			4,304	578		
CV	0.1901	0.1896			0.0807	0.0772		
90% CI	5,596	8,793			7,059	948		
Lower	8,769	13,859			41,753	5,929		
Upper	27,124	42,702			64,906	9,037		
Chum								
Escapement	124,846	167,419	42,573	34.1%	70,124	11,329	-58,795	-83.8%
Total Var	123,335,300	116,399,761			31,159,885	604,411		
SE	11,106	10,789			5,582	777		
CV	0.0890	0.0644			0.0796	0.0686		
90% CI	18,213	17,694			9,155	1,275		
Lower	94,976	138,401			55,110	9,238		
Upper	154,716	196,437			85,137	13,420		

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Coho	Didson IS	Bendix IS	Difference	Percent Deviation	Didson OS	Bendix OS	Difference	Percent Deviation
Escapement	88,587	53,055	-35,531	-40.1%	58,410	8,592	-49,819	-85.3%
Total Var	143,934,410	42,477,801			67,571,738	693,025		
SE	11,997	6,517			8,220	832		
CV	0.1354	0.1228			0.1407	0.0969		
90% CI	19,676	10,689			13,481	1,365		
Lower	56,319	35,526			36,301	6,353		
Upper	120,854	70,585			80,519	10,831		
Pink								
Escapement	517,574	313,483	-204,090	-39.4%	146,576	14,132	-132,444	-90.4%
Total Var	330,295,937	61,237,597			95,312,970	772,764		
SE	18,174	7,825			9,763	879		
CV	0.0351	0.0250			0.0666	0.0622		
90% CI	29,805	12,834			16,011	1,442		
Lower	468,693	292,436			120,318	11,768		
Upper	566,455	334,531			172,834	16,497		

Appendix C10.—DIDSON and Bendix right bank total paired daily salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Date	DIDSON		Bendix		
	Daily Counts		Daily Counts	Difference	Percent Deviation
6/10	666		1,074	408	
6/11	903		964	61	
6/12	879		922	43	
6/13	866		1,088	222	
6/14	1,478		1,612	134	
6/15	6,096		5,256	-840	
6/16	2,704		1,484	-1,220	
6/17	3,331		2,791	-540	
6/18	88,414		102,249	13,835	
6/19	52,758		63,752	10,994	
6/20	18,549		20,805	2,256	
6/21	45,262		46,688	1,426	
6/22	43,636		41,421	-2,215	
6/23	32,082		33,898	1,816	
6/24	42,238		53,231	10,993	
6/25	37,780		35,512	-2,268	
6/26	32,864		25,364	-7,500	
6/27	27,230		19,221	-8,009	
6/28	14,782		9,517	-5,265	
6/29	13,543		10,028	-3,515	
6/30	49,336		39,782	-9,554	
7/1	110,941		106,427	-4,514	
7/2	77,524		75,084	-2,440	
7/3	31,256		27,465	-3,791	
7/4	25,550		18,784	-6,766	
7/5	18,080		12,087	-5,993	
7/6	20,497		12,966	-7,531	
7/7	27,735		20,889	-6,846	
7/8	35,955		22,355	-13,600	
7/9	21,765		11,088	-10,677	
7/10	30,638		16,673	-13,965	
7/11	32,954		18,574	-14,380	
7/12	19,140		17,969	-1,171	
7/13	7,042		5,593	-1,449	
7/14	7,712		4,709	-3,003	
7/15	5,306		3,807	-1,499	
7/16	8,048		5,200	-2,848	
7/17	26,662		19,025	-7,637	
Total	1,022,202		915,354	-106,848	-10.5%

Appendix C11.—DIDSON and Bendix right bank inshore stratum paired daily salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Date	DIDSON		Bendix		
	Inshore		Inshore	Difference	Percent Deviation
6/10	574		699	125	
6/11	836		725	-111	
6/12	769		678	-91	
6/13	787		864	77	
6/14	992		1,344	352	
6/15	4,600		5,059	459	
6/16	2,339		1,362	-977	
6/17	2,486		2,569	83	
6/18	76,368		98,747	22,379	
6/19	48,829		62,904	14,075	
6/20	16,639		20,290	3,651	
6/21	42,611		45,965	3,354	
6/22	40,735		40,458	-277	
6/23	30,556		33,336	2,780	
6/24	39,957		52,585	12,628	
6/25	34,582		34,951	369	
6/26	30,085		25,078	-5,007	
6/27	23,016		18,998	-4,018	
6/28	12,915		9,411	-3,504	
6/29	12,071		9,967	-2,104	
6/30	45,541		39,583	-5,958	
7/1	106,386		105,854	-532	
7/2	74,550		74,228	-322	
7/3	28,721		26,883	-1,838	
7/4	23,647		18,226	-5,421	
7/5	16,705		11,803	-4,902	
7/6	18,891		12,649	-6,242	
7/7	25,807		20,582	-5,225	
7/8	33,024		22,071	-10,953	
7/9	19,254		10,853	-8,401	
7/10	26,643		16,313	-10,330	
7/11	29,879		18,199	-11,680	
7/12	17,279		17,203	-76	
7/13	6,313		5,449	-864	
7/14	6,605		4,515	-2,090	
7/15	4,850		3,673	-1,177	
7/16	7,069		5,107	-1,962	
7/17	23,457		18,849	-4,608	
Total	936,369		898,030	-38,339	-4.1%

Appendix C12.—DIDSON and Bendix right bank offshore stratum paired daily salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Date	DIDSON		Bendix		
	Offshore		Offshore	Difference	Percent Deviation
6/10	92		375	283	
6/11	67		239	172	
6/12	110		244	134	
6/13	79		224	145	
6/14	486		268	-218	
6/15	1,496		197	-1,299	
6/16	365		122	-243	
6/17	845		222	-623	
6/18	12,047		3,502	-8,545	
6/19	3,928		848	-3,080	
6/20	1,909		515	-1,394	
6/21	2,651		723	-1,928	
6/22	2,901		963	-1,938	
6/23	1,526		562	-964	
6/24	2,280		646	-1,634	
6/25	3,199		561	-2,638	
6/26	2,779		286	-2,493	
6/27	4,214		223	-3,991	
6/28	1,867		106	-1,761	
6/29	1,472		61	-1,411	
6/30	3,795		199	-3,596	
7/1	4,555		573	-3,982	
7/2	2,974		856	-2,118	
7/3	2,536		582	-1,954	
7/4	1,903		558	-1,345	
7/5	1,375		284	-1,091	
7/6	1,605		317	-1,288	
7/7	1,928		307	-1,621	
7/8	2,931		284	-2,647	
7/9	2,512		235	-2,277	
7/10	3,995		360	-3,635	
7/11	3,075		375	-2,700	
7/12	1,861		766	-1,095	
7/13	729		144	-585	
7/14	1,107		194	-913	
7/15	456		134	-322	
7/16	979		93	-886	
7/17	3,205		176	-3,029	
Total	85,833		17,324	-68,509	-79.8%

Appendix C13.—DIDSON right bank inshore stratum daily hourly salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Hour	Date										Total
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	
0100	6	18	48	67	30	175	175	48	194	3,878	4,640
0200	24	36	6	6	0	145	163	115	513	2,537	3,546
0300	24	24	24	18	48	79	42	121	436	3,037	3,854
0400	24	24	30	0	12	115	24	66	339	1,528	2,163
0500	12	-6	6	30	36	194	48	60	327	1,419	2,127
0600	6	48	30	6	61	193	72	164	864	1,897	3,341
0700	0	18	18	12	-12	320	145	66	737	1,561	2,866
0800	6	18	-6	6	0	200	72	169	1,293	2,428	4,186
0900	0	24	36	6	48	187	230	85	1,879	2,483	4,978
1000	18	12	0	12	-6	73	79	73	821	2,444	3,526
1100	0	18	12	12	0	193	182	73	1,305	2,196	3,991
1200	6	36	30	12	0	133	206	18	538	1,909	2,889
1300	12	36	30	6	42	296	169	200	1,319	2,348	4,459
1400	73	61	0	0	12	284	109	12	5,291	865	6,707
1500	36	0	0	0	91	368	109	85	5,242	1,634	7,565
1600	18	24	0	36	30	424	24	54	9,356	2,311	12,278
1700	54	79	97	85	97	350	30	61	8,168	1,585	10,605
1800	42	6	133	139	85	157	48	163	8,565	1,365	10,704
1900	79	48	91	109	30	66	48	133	7,442	1,208	9,255
2000	0	30	97	109	30	157	85	103	4,947	2,440	7,998
2100	18	73	0	6	12	175	18	36	7,412	1,803	9,554
2200	54	30	0	48	91	85	72	133	4,840	1,577	6,931
2300	54	79	54	36	127	109	42	103	2,609	2,585	5,800
2400	6	97	30	25	127	121	145	345	1,930	1,791	4,617

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Hour	Date										Total
	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	
0100	1,184	1,755	2,434	1,081	2,475	1,142	1,585	1,262	1,095	296	14,309
0200	1,281	1,809	2,144	768	1,749	538	1,432	1,577	835	230	12,361
0300	640	1,755	1,166	545	574	689	918	1,963	883	375	9,507
0400	563	906	1,174	212	459	544	556	936	411	489	6,250
0500	254	557	1,676	430	296	436	344	248	266	357	4,863
0600	381	968	1,507	809	888	1,355	333	882	321	459	7,902
0700	363	2,051	1,667	664	1,830	1,033	791	948	526	350	10,225
0800	424	3,099	2,771	2,027	1,634	1,570	817	332	809	423	13,905
0900	248	882	743	3,093	2,332	1,534	362	1,029	309	581	11,112
1000	513	448	858	659	1,434	1,821	254	1,295	368	200	7,851
1100	399	2,698	1,144	435	2,063	2,118	1,204	1,210	459	865	12,595
1200	139	834	2,030	333	926	664	2,233	1,552	296	376	9,382
1300	489	767	1,981	1,250	1,589	1,222	774	811	1,745	985	11,614
1400	781	2,075	1,492	666	2,392	714	974	1,329	387	424	11,233
1500	744	1,640	1,531	1,519	1,317	1,476	1,261	533	652	652	11,325
1600	127	1,552	2,072	575	1,788	2,748	774	381	169	133	10,320
1700	1,131	2,440	1,652	1,349	2,277	2,257	954	490	405	193	13,149
1800	454	1,860	998	1,367	1,824	902	1,277	424	278	127	9,511
1900	1,262	3,207	948	1,999	2,350	1,712	1,190	430	460	242	13,800
2000	1,419	2,118	1,464	960	1,800	1,010	1,779	393	424	139	11,507
2100	803	2,332	1,700	1,673	1,137	1,842	1,842	1,053	478	315	13,176
2200	502	2,851	3,019	2,705	2,978	2,174	2,614	1,479	339	942	19,603
2300	587	1,788	2,602	3,546	1,226	2,102	2,754	859	405	1,715	17,585
2400	1,951	2,221	1,963	1,891	2,621	2,978	3,062	1,600	593	1,202	20,082

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Hour	Date									Total	
	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8		
0100	1,857	6,516	5,376	2,495	930	906	532	557	1,083	690	20,941
0200	1,501	3,751	4,579	2,378	743	991	519	882	793	442	16,577
0300	1,821	4,435	2,735	1,679	720	773	550	314	920	387	14,334
0400	1,370	3,582	2,072	1,154	829	641	466	604	1,004	284	12,006
0500	1,579	3,340	2,271	1,307	417	664	551	327	1,585	381	12,421
0600	2,529	2,390	3,811	1,812	726	532	991	604	1,510	823	15,728
0700	1,891	2,905	2,742	1,192	1,367	968	1,101	581	1,428	920	15,095
0800	1,458	4,834	2,106	1,311	599	1,144	1,206	841	1,136	756	15,390
0900	752	3,552	3,624	1,353	1,432	738	1,426	1,824	3,093	670	18,463
1000	556	4,047	2,832	1,564	1,089	697	1,746	187	2,602	761	16,081
1100	708	1,450	2,214	974	442	495	635	1,773	407	877	9,976
1200	1,164	3,982	641	308	429	424	466	1,773	3,854	829	13,869
1300	1,367	5,294	3,437	942	514	345	375	1,337	1,265	1,279	16,155
1400	1,531	5,264	5,627	876	1,059	471	182	889	1,029	502	17,429
1500	3,527	3,074	6,904	1,597	1,785	829	309	164	708	448	19,345
1600	1,016	4,895	3,752	393	1,271	73	296	248	1,198	557	13,697
1700	1,999	9,429	448	393	1,930	670	1,422	799	1,634	985	19,709
1800	2,594	6,336	3,110	2,114	1,440	1,014	828	2,114	1,597	1,137	22,284
1900	1,912	7,556	5,173	1,712	1,010	732	1,646	2,432	2,102	1,287	25,563
2000	739	4,713	962	496	477	938	254	1,220	1,212	997	12,008
2100	918	5,309	2,402	320	1,912	623	483	1,803	495	1,113	15,380
2200	1,311	2,217	393	672	956	744	641	1,029	1,053	502	9,517
2300	6,099	1,776	3,600	1,099	960	749	1,416	1,622	809	1,256	19,386
2400	5,343	5,738	3,739	580	610	545	853	1,885	508	1,371	21,171

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Hour	Date							Total	
	7/10	7/11	7/12	7/13	7/14	7/15	7/16		
0100	942	1,089	1,700	357	152	109	182	508	5,039
0200	634	841	768	182	115	67	79	121	2,807
0300	332	870	538	175	151	30	30	266	2,394
0400	580	948	429	139	97	121	85	169	2,568
0500	641	749	611	242	205	109	91	1,009	3,657
0600	513	954	1,216	145	193	115	79	1,004	4,220
0700	1,815	927	992	266	296	466	121	974	5,858
0800	1,198	1,027	871	394	399	320	145	954	5,309
0900	1,111	551	666	376	483	502	54	1,341	5,085
1000	1,229	1,788	859	188	363	206	42	563	5,237
1100	2,493	1,549	908	181	248	139	278	799	6,595
1200	151	3,055	54	278	513	139	127	900	5,219
1300	1,105	2,422	1,827	158	430	568	363	1,144	8,016
1400	519	2,027	1,027	151	484	145	726	888	5,967
1500	714	616	755	109	369	551	1,262	1,115	5,491
1600	200	599	683	286	363	296	322	1,573	4,322
1700	985	1,558	719	97	369	212	1,089	1,513	6,541
1800	774	1,668	339	520	302	242	598	2,106	6,549
1900	1,703	1,545	435	616	248	169	157	1,558	6,432
2000	2,126	738	611	326	206	133	381	1,809	6,330
2100	1,196	617	303	375	200	61	175	581	3,507
2200	2,807	691	290	254	139	67	230	1,184	5,661
2300	1,501	1,361	242	248	151	30	260	749	4,542
2400	1,371	1,688	436	248	127	54	194	629	4,747

Appendix C14.—Bendix right bank inshore stratum daily hourly salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Hour	Date										Total
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	
II	0100	12	36	103	35	30	236	94	95	466	4,501
	0200	9	22	35	17	17	140	61	64	677	3,934
	0300	31	13	40	19	41	158	49	95	659	3,903
	0400	14	25	13	35	39	219	60	74	896	2,070
	0500	14	3	25	31	35	253	47	126	929	2,454
	0600	10	33	11	31	25	334	77	187	1,065	2,784
	0700	18	30	36	17	59	418	62	88	1,736	2,307
	0800	31	11	54	30	44	185	58	91	2,408	2,598
	0900	9	43	25	10	49	297	73	64	2,376	3,812
	1000	12	16	25	10	31	109	65	54	807	2,941
	1100	37	63	10	15	11	188	71	72	939	1,851
	1200	28	40	31	9	40	263	38	46	928	2,525
	1300	73	27	24	37	89	292	68	69	2,647	2,003
	1400	2	27	0	0	52	243	39	28	5,105	1,873
	1500	52	0	0	0	91	264	57	40	7,491	2,728
	1600	24	31	0	57	74	443	22	107	7,321	1,607
	1700	32	28	59	89	83	275	36	43	9,814	1,672
	1800	31	43	24	53	73	76	26	61	11,681	2,115
	1900	38	15	36	41	38	81	42	144	11,088	2,586
	2000	0	24	71	65	44	148	34	126	8,937	3,593
	2100	26	45	0	69	64	124	30	128	7,172	2,455
	2200	45	47	0	63	60	86	43	159	3,452	2,221
	2300	63	52	21	59	66	135	116	247	5,092	2,430
	2400	88	51	35	72	189	92	94	361	5,061	1,941

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Hour	Date										Total
	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	
0100	1,599	2,229	2,924	1,330	3,458	1,570	1,618	1,690	904	167	17,489
0200	1,418	2,590	2,157	1,014	1,716	838	1,391	1,790	746	325	13,985
0300	1,050	2,177	1,938	760	1,013	845	763	1,353	675	387	10,961
0400	776	1,179	1,780	450	686	755	557	700	389	317	7,589
0500	333	1,043	1,409	506	700	787	520	623	262	342	6,525
0600	565	1,458	1,416	952	1,810	1,398	559	946	315	273	9,692
0700	719	3,149	1,146	1,089	2,261	1,437	902	867	584	249	12,403
0800	657	2,866	2,712	948	2,211	1,580	695	568	710	460	13,407
0900	634	1,737	1,088	1,767	2,872	773	423	778	349	502	10,923
1000	348	690	1,232	436	1,535	608	135	346	279	283	5,892
1100	367	1,123	1,920	846	1,031	1,520	519	83	96	200	7,705
1200	893	1,445	1,625	1,010	1,505	1,226	834	1,405	69	106	10,118
1300	416	2,097	1,767	2,209	3,197	1,370	814	761	902	89	13,622
1400	858	2,127	861	1,138	4,331	2,190	757	808	356	302	13,728
1500	495	1,370	1,526	886	3,560	2,200	1,501	951	298	617	13,404
1600	579	1,289	1,432	856	1,380	1,223	611	614	287	125	8,396
1700	742	2,443	1,704	1,810	2,649	1,087	1,035	407	313	239	12,429
1800	750	2,282	1,271	1,647	2,818	977	747	590	202	148	11,432
1900	1,621	3,290	1,525	2,009	2,442	1,207	1,197	315	155	101	13,862
2000	912	1,708	1,766	1,860	3,027	2,027	1,254	411	312	141	13,418
2100	757	1,063	1,022	1,268	925	1,726	1,251	532	328	500	9,372
2200	1,144	1,976	1,780	2,586	1,682	2,218	2,854	796	273	1,089	16,398
2300	768	1,801	2,484	3,173	3,325	2,977	1,952	782	267	1,484	19,013
2400	1,889	2,833	1,973	2,786	2,451	2,412	2,189	882	340	1,521	19,276

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Hour	Date									Total	
	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8		
0100	1,449	5,647	4,907	2,459	806	804	431	430	888	358	18,179
0200	1,060	4,928	3,713	2,011	807	822	264	401	740	358	15,104
0300	1,415	3,342	2,299	1,288	712	638	430	351	800	234	11,509
0400	1,581	3,753	1,057	969	534	601	482	316	978	240	10,511
0500	2,227	3,064	1,542	222	324	625	592	344	1,195	422	10,557
0600	2,698	3,430	2,419	805	91	185	597	498	1,025	600	12,348
0700	1,680	4,601	2,228	864	543	135	209	576	1,312	567	12,715
0800	1,033	4,981	3,438	1,466	1,001	345	239	127	666	448	13,744
0900	714	3,634	4,950	1,473	1,514	439	495	719	136	265	14,339
1000	703	2,381	1,301	732	448	325	665	724	568	342	8,189
1100	527	2,557	1,054	370	342	342	234	1,067	1,160	352	8,005
1200	558	2,927	2,341	642	297	237	218	1,066	1,703	990	10,979
1300	625	3,563	3,048	1,263	750	460	306	797	1,029	726	12,567
1400	528	5,349	6,136	836	915	223	279	418	746	220	15,650
1500	914	4,278	3,057	1,140	1,024	338	220	413	550	325	12,259
1600	1,135	7,164	3,646	740	815	404	695	644	742	414	16,399
1700	2,174	7,031	5,203	1,584	1,379	717	1,154	1,058	1,584	571	22,455
1800	2,076	5,884	2,503	2,252	1,176	733	920	1,759	1,770	628	19,701
1900	1,250	8,399	4,005	1,900	778	817	865	1,978	1,117	420	21,529
2000	664	3,485	2,267	812	761	490	607	984	818	284	11,172
2100	832	3,724	2,936	474	1,101	329	349	1,919	700	395	12,759
2200	2,769	2,075	2,604	846	929	788	906	1,383	883	483	13,666
2300	5,644	4,515	4,120	838	735	473	944	1,225	613	597	19,704
2400	5,327	5,142	3,454	897	444	533	548	1,385	348	614	18,692

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Hour	Date							Total	
	7/10	7/11	7/12	7/13	7/14	7/15	7/16		
0100	310	897	871	156	73	56	62	153	2,578
0200	331	738	1,281	125	83	56	55	142	2,811
0300	283	828	2,474	142	78	87	43	110	4,045
0400	513	976	1,393	188	76	98	79	269	3,592
0500	891	608	1,522	111	111	111	73	549	3,976
0600	732	577	736	295	157	130	53	516	3,196
0700	980	661	677	310	249	311	71	680	3,939
0800	813	627	707	445	310	328	86	1,022	4,338
0900	328	600	743	220	191	318	72	828	3,300
1000	104	292	830	184	226	140	69	658	2,503
1100	1,401	256	133	135	216	216	121	853	3,331
1200	532	1,337	642	253	297	205	101	825	4,192
1300	993	1,939	1,173	264	312	258	381	644	5,964
1400	359	881	726	296	354	199	501	705	4,021
1500	199	411	371	125	248	187	811	1,145	3,497
1600	341	472	512	217	266	231	747	1,527	4,313
1700	787	752	409	320	262	117	443	1,644	4,734
1800	737	1,174	435	484	281	139	206	1,791	5,247
1900	997	631	394	347	154	87	118	1,393	4,121
2000	856	606	218	210	118	99	198	920	3,225
2100	733	460	126	131	139	88	271	826	2,774
2200	1,235	719	289	205	139	66	250	689	3,592
2300	952	834	298	168	87	80	162	508	3,089
2400	906	923	243	118	88	66	134	452	2,930

Appendix C15.—DIDSON right bank offshore stratum daily hourly salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Hour	Date										Total
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	
0100	0	6	6	0	6	36	24	0	55	128	262
0200	0	24	0	6	0	49	6	6	49	176	316
0300	6	6	6	0	12	61	6	30	79	49	256
0400	-6	0	0	0	0	24	6	43	128	103	298
0500	0	0	0	0	6	12	0	0	18	61	97
0600	0	0	0	0	0	43	6	6	6	79	140
0700	-6	6	0	0	18	12	6	24	18	97	176
0800	18	0	0	0	0	0	12	0	12	67	110
0900	6	0	12	0	0	67	12	30	109	12	249
1000	12	6	6	6	0	43	6	24	268	201	572
1100	18	0	6	0	0	182	12	24	261	359	864
1200	0	0	6	0	0	85	12	6	237	134	480
1300	6	6	12	0	0	128	24	30	547	122	876
1400	0	0	0	0	0	140	12	55	766	292	1,265
1500	18	0	0	12	30	91	12	0	699	195	1,058
1600	6	0	0	6	6	164	30	36	2,293	109	2,651
1700	0	0	6	0	12	30	61	30	1,429	176	1,745
1800	6	6	18	0	24	152	0	55	912	316	1,490
1900	6	0	0	0	12	97	24	128	1,611	189	2,068
2000	0	0	18	43	85	43	18	164	851	280	1,502
2100	0	6	0	6	43	6	0	43	943	432	1,478
2200	0	0	0	0	79	18	12	36	420	219	784
2300	0	0	6	0	85	6	30	49	158	67	401
2400	0	0	6	0	67	6	30	24	176	67	377

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Hour	Date										Total
	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	
0100	30	91	49	30	43	91	67	122	116	73	711
0200	-6	67	91	36	30	91	12	30	18	109	480
0300	0	30	152	30	18	18	12	97	30	97	486
0400	24	24	128	18	12	18	24	49	18	122	438
0500	-12	30	18	-6	18	12	12	36	24	30	164
0600	36	103	49	30	18	18	6	91	36	12	401
0700	30	61	91	30	49	24	24	43	43	24	420
0800	24	18	30	30	49	43	30	36	30	55	347
0900	43	36	195	6	43	140	36	49	49	30	626
1000	36	43	201	73	85	201	164	43	36	18	900
1100	12	67	91	158	109	207	213	499	97	24	1,478
1200	79	152	128	195	249	146	128	870	426	18	2,390
1300	55	97	61	61	6	36	103	261	261	146	1,089
1400	61	61	140	109	334	128	79	310	79	134	1,435
1500	85	170	341	55	122	572	626	255	182	182	2,591
1600	158	109	182	85	79	255	134	109	109	91	1,314
1700	55	590	85	55	255	146	97	103	49	67	1,502
1800	79	164	79	24	128	128	134	195	43	36	1,009
1900	231	122	158	91	43	61	286	91	24	0	1,107
2000	268	158	109	128	158	243	189	420	18	55	1,745
2100	255	140	73	97	91	152	140	213	36	43	1,241
2200	140	225	109	79	261	152	97	164	36	85	1,350
2300	152	49	97	43	55	261	67	73	97	0	894
2400	73	43	243	67	24	55	97	55	6	18	681

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Hour	Date									Total	
	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8		
0100	134	146	103	73	24	91	116	73	97	73	930
0200	304	122	49	55	30	91	79	49	36	79	894
0300	255	170	73	43	24	18	134	30	67	73	888
0400	134	85	49	12	97	49	36	67	61	24	614
0500	55	43	73	158	85	24	30	55	61	85	669
0600	146	73	97	55	189	61	-6	49	73	61	797
0700	91	164	0	61	97	152	55	36	24	36	718
0800	49	134	30	116	73	6	85	128	6	67	693
0900	43	43	49	24	55	-6	0	55	237	116	614
1000	85	414	79	67	122	73	347	49	67	109	1,411
1100	6	152	140	85	43	170	85	164	67	134	1,046
1200	316	170	61	97	55	12	79	116	359	18	1,283
1300	134	687	79	61	128	30	73	176	182	73	1,624
1400	176	146	316	189	103	43	36	55	334	67	1,466
1500	213	116	243	432	134	24	6	67	182	55	1,472
1600	316	36	499	128	91	24	30	73	140	122	1,459
1700	164	414	207	158	67	55	43	73	0	97	1,277
1800	243	207	128	134	73	97	24	91	49	24	1,070
1900	195	128	73	103	61	67	55	67	626	456	1,830
2000	146	280	189	158	103	49	-6	128	43	389	1,478
2100	158	505	109	122	103	49	43	134	73	268	1,563
2200	67	134	97	109	6	55	97	67	61	24	718
2300	24	85	146	55	103	73	55	49	73	-6	657
2400	341	103	85	43	36	67	109	79	12	67	943

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Hour	Date							Total	
	7/10	7/11	7/12	7/13	7/14	7/15	7/16		
0100	134	158	116	30	85	36	-12	97	645
0200	219	79	79	18	18	49	18	103	584
0300	152	85	213	18	91	18	43	158	778
0400	146	122	109	-6	24	6	18	414	833
0500	97	49	49	24	-6	-6	6	91	304
0600	91	79	24	-6	18	6	6	73	292
0700	109	85	61	30	67	18	-6	49	414
0800	6	158	67	0	36	30	0	24	322
0900	73	146	128	49	24	18	18	30	486
1000	195	189	140	109	109	18	0	176	936
1100	189	12	67	36	61	0	36	128	529
1200	201	164	55	12	6	-12	18	67	511
1300	219	334	49	30	134	67	-6	36	863
1400	310	213	152	30	85	61	67	128	1,046
1500	236	97	213	12	55	0	73	146	832
1600	255	49	36	73	61	97	103	73	748
1700	92	55	30	43	6	0	146	298	669
1800	219	265	6	49	24	30	122	310	1,025
1900	347	18	49	36	55	12	73	310	900
2000	310	286	55	30	12	-6	24	328	1,040
2100	268	189	49	43	73	12	61	49	742
2200	67	67	43	18	24	0	6	12	237
2300	24	30	36	18	55	0	18	73	255
2400	36	146	36	30	-12	0	146	30	414

Appendix C16.—Bendix left bank offshore stratum daily hourly salmon counts, Nushagak River sonar project, 10 June–17 July, 2005.

Hour	Date										Total
	6/10	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	
0100	23	0	9	0	9	14	2	17	10	52	136
0200	11	3	17	1	11	15	1	9	30	56	154
0300	7	37	41	4	32	5	0	2	39	18	185
0400	10	2	10	3	6	12	0	0	25	14	82
0500	0	0	1	1	6	4	2	4	1	32	51
0600	2	17	15	13	22	0	18	16	7	27	137
0700	5	8	20	10	12	9	2	4	2	18	90
0800	3	2	17	5	2	5	14	7	9	26	90
0900	3	23	11	5	0	0	13	4	40	77	176
1000	3	3	5	12	0	37	17	29	33	21	160
1100	48	0	4	20	7	23	4	44	40	16	206
1200	0	36	40	2	11	9	6	4	25	52	185
1300	80	21	34	3	7	4	5	7	25	24	210
1400	67	0	0	0	3	13	2	15	180	56	336
1500	10	0	0	13	19	7	0	0	244	47	340
1600	1	4	0	11	11	5	5	3	311	44	395
1700	5	2	6	2	15	6	3	5	509	30	583
1800	11	2	4	4	11	4	3	3	351	37	430
1900	26	5	0	0	11	7	7	2	672	48	778
2000	0	2	2	25	6	8	1	17	598	62	721
2100	27	52	0	10	3	3	0	8	97	35	235
2200	16	5	0	72	18	4	0	14	85	21	235
2300	17	5	3	2	16	1	8	2	79	30	163
2400	0	10	5	6	30	2	9	6	90	5	163

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Hour	Date										Total
	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29	
0100	2	25	11	0	20	77	18	12	12	4	181
0200	1	18	63	5	30	51	6	11	5	6	196
0300	17	18	66	14	29	64	7	13	6	3	237
0400	4	3	13	27	11	37	1	7	1	7	111
0500	2	17	14	1	7	24	5	11	4	4	89
0600	7	8	12	37	20	20	19	1	2	0	126
0700	3	13	23	5	3	10	9	14	5	1	86
0800	13	17	30	3	7	11	8	2	3	2	96
0900	7	20	39	19	2	5	11	11	5	1	120
1000	10	14	65	16	20	10	4	19	7	0	165
1100	19	92	34	26	30	17	6	5	9	3	241
1200	16	51	54	21	21	19	29	5	4	2	222
1300	31	22	33	43	77	10	16	15	3	5	255
1400	22	20	33	53	54	27	9	32	3	3	256
1500	19	24	159	12	28	32	16	15	3	1	309
1600	38	22	40	13	30	24	14	12	4	2	199
1700	55	44	16	22	36	24	11	4	9	5	226
1800	66	62	24	21	6	7	11	2	5	2	206
1900	43	35	25	41	32	25	11	3	2	1	218
2000	29	46	30	35	49	13	9	11	0	0	222
2100	36	24	76	44	18	9	23	6	1	4	241
2200	25	41	51	26	61	13	16	6	4	0	243
2300	35	54	42	21	41	30	17	3	4	1	248
2400	15	33	10	57	14	2	10	3	5	4	153

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Hour	Date									Total	
	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8		
0100	7	11	31	47	23	25	18	22	7	11	202
0200	2	8	26	61	35	46	24	14	21	7	244
0300	17	5	17	29	28	17	22	21	28	23	207
0400	6	5	14	6	14	17	13	8	15	10	108
0500	7	6	14	16	18	11	10	15	7	13	117
0600	14	4	23	45	13	9	7	18	17	8	158
0700	20	12	14	18	44	4	19	6	10	13	160
0800	8	29	17	17	57	10	4	12	11	11	176
0900	3	32	54	17	26	7	14	19	5	7	184
1000	9	35	48	43	29	19	20	17	2	6	228
1100	6	31	49	18	14	9	9	29	12	20	197
1200	6	40	35	31	7	5	16	23	23	11	197
1300	3	43	26	27	14	4	5	18	19	18	177
1400	9	71	62	16	15	14	8	26	14	10	245
1500	24	124	61	26	28	16	4	3	4	2	292
1600	6	22	41	30	24	9	5	2	10	6	155
1700	5	0	37	15	13	11	13	15	22	7	138
1800	12	2	54	10	39	10	11	10	8	9	165
1900	14	30	62	13	32	7	14	9	7	11	199
2000	5	8	33	18	13	9	13	6	6	4	115
2100	3	9	45	26	14	3	9	2	5	1	117
2200	7	0	22	6	24	10	17	5	12	10	113
2300	0	9	41	23	20	6	19	2	8	12	140
2400	6	37	30	24	14	6	23	5	11	5	161

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Hour	Date							Total	
	7/10	7/11	7/12	7/13	7/14	7/15	7/16		
0100	9	41	17	9	8	4	2	8	98
0200	17	37	38	12	3	0	1	12	120
0300	25	53	61	1	8	6	4	9	167
0400	26	54	445	5	4	5	0	5	544
0500	11	25	95	6	13	8	0	3	161
0600	42	19	15	6	5	3	6	9	105
0700	14	10	2	3	6	11	7	7	60
0800	16	11	6	7	8	8	0	9	65
0900	22	22	15	6	14	5	9	5	98
1000	3	9	9	12	11	0	2	2	48
1100	12	0	7	3	22	15	3	4	66
1200	24	6	6	9	3	4	4	10	66
1300	35	8	4	2	6	15	2	3	75
1400	13	0	3	5	11	8	11	5	56
1500	11	18	4	3	5	7	4	5	57
1600	10	3	10	10	12	12	10	9	76
1700	8	10	6	1	9	3	11	15	63
1800	11	6	3	5	13	1	2	12	53
1900	6	4	5	3	4	7	0	10	39
2000	13	7	0	10	1	3	4	7	45
2100	12	8	3	8	3	1	0	11	46
2200	4	16	6	2	3	5	4	6	46
2300	7	2	1	6	11	0	5	6	38
2400	9	6	5	10	11	3	2	4	50

Appendix C17.—DIDSON and Bendix total escapement estimates for the right bank by species, Nushagak River sonar project, 10 June–17 July, 2005.

Total	Didson	Bendix	Difference	Percent Deviation
Escapement	1,022,202	915,354	-106,848	-10.5%
Total Var	595,221,234	526,722,688		
SE	24,397	22,950		
CV	0.0239	0.0251		
90% CI	40,011	37,639		
Lower	956,584	853,626		
Upper	1,087,821	977,082		
<hr/>				
Sockeye				
Escapement	647,694	586,402	-61,292	-9.5%
Total Var	279,146,667	181,865,725		
SE	16,708	13,486		
CV	0.0258	0.0230		
90% CI	27,401	22,117		
Lower	602,757	550,131		
Upper	692,631	622,674		
<hr/>				
Chinook				
Escapement	70,845	58,799	-12,047	-17.0%
Total Var	80,681,592	112,422,462		
SE	8,982	10,603		
CV	0.1268	0.1803		
90% CI	14,731	17,389		
Lower	46,687	30,281		
Upper	95,004	87,316		
<hr/>				
Chum				
Escapement	303,663	270,153	-33,510	-11.0%
Total Var	235,392,975	232,434,501		
SE	15,343	15,246		
CV	0.0505	0.0564		
90% CI	25,162	25,003		
Lower	262,398	229,148		
Upper	344,928	311,158		

Appendix C18.—DIDSON and Bendix escapement estimates by species for the right bank inshore and offshore stratum, 10 June–17 July, Nushagak River sonar project.

Strata Total	Didson IS	Bendix IS	Difference	Percent Deviation	Didson OS	Bendix OS	Difference	Percent Deviation
Escapement	936,369	898,030	-38,339	-4.1%	85,833	17,324	-68,509	-79.8%
Total Var	577,080,900	525,655,134			18,140,335	1,067,553		
SE	24,023	22,927			4,259	1,033		
CV	0.0257	0.0255			0.0496	0.0596		
90% CI	39,397	37,601			6,985	1,694		
Lower	871,758	836,365			74,378	14,545		
Upper	1,000,980	959,695			97,289	20,103		
Sockeye								
Escapement	625,752	582,645	-43,106	-6.9%	21,942	3,757	-18,185	-82.9%
Total Var	275,357,308	181,674,795			3,789,359	190,930		
SE	16,594	13,479			1,947	437		
CV	0.0265	0.0231			0.0887	0.1163		
90% CI	27,214	22,105			3,192	717		
Lower	581,121	546,393			16,707	2,582		
Upper	670,383	618,898			27,178	4,932		
Chinook								
Escapement	45,564	52,669	7,105	15.6%	25,281	6,129	-19,152	-75.8%
Total Var	74,290,934	112,015,102			6,390,658	407,361		
SE	8,619	10,584			2,528	638		
CV	0.1892	0.2009			0.1000	0.1041		
90% CI	14,136	17,357			4,146	1,047		
Lower	22,382	24,203			18,482	4,413		
Upper	68,746	81,135			32,081	7,846		
Chum								
Escapement	265,053	262,715	-2,338	-0.9%	38,610	7,438	-31,172	-80.7%
Total Var	227,432,658	231,965,238			7,960,318	469,263		
SE	15,081	15,230			2,821	685		
CV	0.0569	0.0580			0.0731	0.0921		
90% CI	24,733	24,978			4,627	1,123		
Lower	224,492	221,752			31,021	5,595		
Upper	305,615	303,679			46,198	9,280		